JUNE, 1956

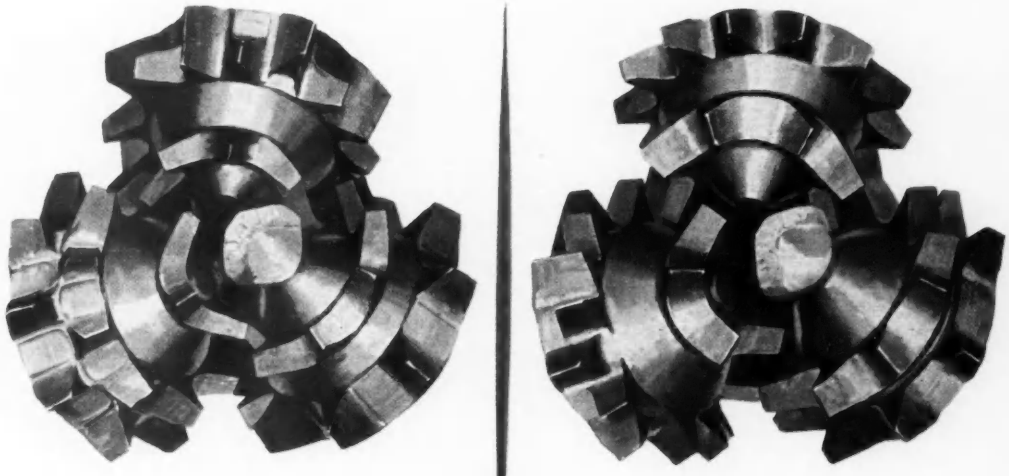
WORLD OIL

SPECIALIZED FOR EXPLORATION, DRILLING
PRODUCING OPERATIONS AND MANAGEMENT

GULF COAST ISSUE

A special report on land and offshore operations in Texas-Louisiana Gulf Coast area. See Page 4.

UNIVERSITY OF MICHIGAN
JUN 12 1956
SCIENCE LIBRARY



THEY LOOK ALIKE ... but

there's a difference in their performance

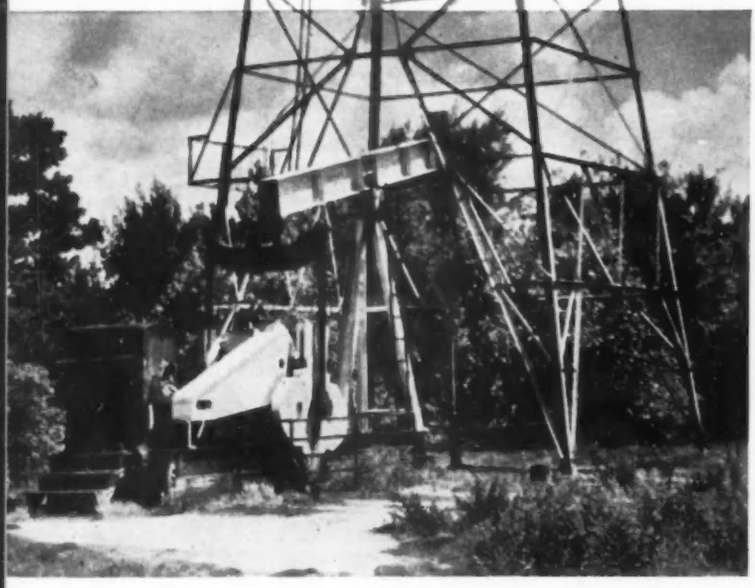
The two rock bits pictured here are excellent examples of the fact that bits that may look alike don't always perform alike.

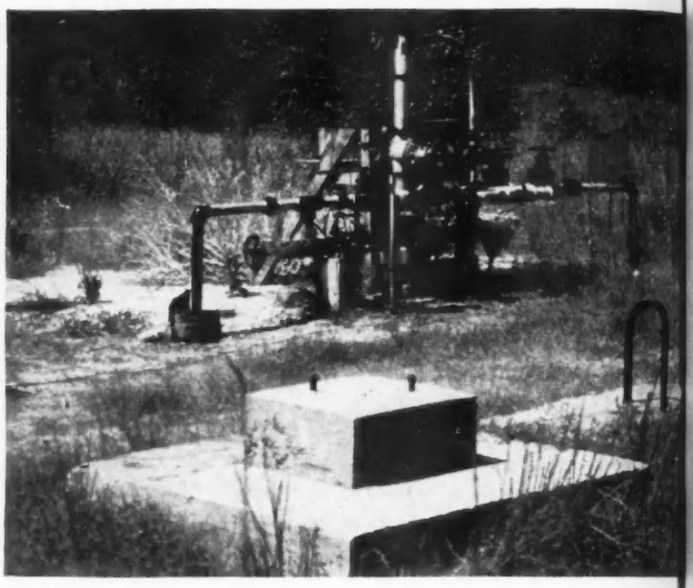
Both bits are similar in design. But changes have made the second bit a faster cutting, better-performing, more versatile bit... capable of drilling a wider range of formations.

Hughes bits are undergoing constant improvement based on continuing research and the world's greatest rock bit experience—over one billion feet of hole drilled in the past 47 years. That's why you can depend on HUGHES bits to consistently drill more hole faster!

Cemented with 'Starcor' in 1936

Original Cementing Jobs Still Holding Tight!





Typical of Lone Star Performance in Oil Field Service

Select Cement to Fit the job!

● Speaking of performance, and that's what counts in selecting an Oil Well cement, consider the truly outstanding record of 'STARCOR' Oil Well Cement under almost every conceivable condition—deep wells, high temperatures, high pressures, difficult squeeze jobs.

'Starcor' was first used extensively throughout the Rodessa field, northwest of Shreveport, in 1936-37. Oil men will find it significant that a large percentage of these wells still are producing—original cementing jobs holding tight, very little if any remedial work. Like the gas-distillate well (above, right) cemented with 'Starcor' in 1936, still flowing, and the oil well (left) on pump, still producing. Typical 'Starcor' performance in many important fields, yesterday and today.

Lone Star offers you four great cements: LONE STAR Cement—a standard of high quality for over four decades . . . 'INCOR'*, America's first High-Early Sulphate Resistant Cement . . . 'STARCOR'* Slow Setting Oil Well Cement . . . 'TEXCOR'* Deep Oil Well Cement. Select the one that fits your job—that extra margin of quality means a lot.

*Reg. U. S. Pat. Off.

LONE STAR CEMENT CORPORATION

Offices: DALLAS • HOUSTON • ABILENE, TEXAS • NEW ORLEANS
KANSAS CITY, MO. • BIRMINGHAM • ALBANY, N. Y. • BETHLEHEM, PA.
BOSTON • CHICAGO • INDIANAPOLIS • NEW YORK • NORFOLK
RICHMOND • WASHINGTON, D. C.

Volume 142, No. 7 June, 1956

CURRENT OUTLOOK SECTION

Looking Ahead ... 75
Editor's Page ... 77
Offshore Development Proving Successful ... Ira H. Cram 78
Pipe Scarcity Threatens to Curtail Drilling ... L. J. Logan, Gilbert M. Wilson and Anthony Gibbon 82
Unfavorable Legislation Shows Why Business Must Make Itself Understood ... M. J. Rathbone 86
First Quarter Earnings Up 20.4% for 45 Oil Companies ... Staff Article 89
How the Cost of Finding and Producing Oil Has Increased ... Staff Article 90
Who Is Listening to Non-Union Employes? ... William S. Wilcox 95
Changing Panorama ... L. J. Logan 100
Report from Observatory ... Ray L. Dudley and Warren L. Baker 105
Petroleum Trends in U. S. ... Cecil W. Smith 106
The Month's Completions ... 109
Wildcat Drilling ... 110

EXPLORATION SECTION

Gulf Coast Tectonics ... Dr. Max Bornhauser 113
Geological Students Go Underwater ... William F. Tanner 126
Madison Problems Are Unusual (Part 2) ... W. M. Laird and C. B. Folsom 136

DRILLING SECTION

Gulf Coast Drilling Mud Practices ... Dr. George R. Gray, G. G. Allen and N. K. Tschirley 155
Diesel-Electric Rigs Making A Comeback ... E. E. Childress 162
Are Diesel-Electrics Moving Inland? ... John N. Schuelke 168
Weather Hazards in Offshore Operations ... Thomas F. Malone 176
When Storms Threaten ... 186
Directional Drilling for Salt Dome Oil Production ... K. R. Joynt and A. H. Massad 192

PRODUCTION SECTION

Pierce Junction Is Hottest Spot on Texas Gulf Coast ... Charles Hoppins 205
How Deep Is Miocene Production in Southern Louisiana? ... 216
Metalizing Helps Lick Gulf Coast Corrosion ... F. W. Gartner, Jr. 220
Don't Short Circuit Your Offshore Operation ... O. E. Lundelius, Jr. 226
Louisiana's Pine Island a Chalk Rock Proving Ground ... C. R. Jordan 240
Cathodic Protection Reaches Up to Cover Splash Zone ... Maurice A. Riordan 250

INTERNATIONAL SECTION

Cities Service Will Seek Oil in Colombia's Carare ... Staff Article 263
Bolivia Wants Help . . . A WORLD OIL Interview with Victor Andrade, Ambassador to U. S. ... Anthony Gibbon 264
Australian Aerial Survey Reports Near Completion ... Harrison T. Brundage 268
Matzen-Auersthal Called West Europe's No. 1 Field ... A. M. Stahmer 270
What's Happening Among World Oil Men ... 276
Rumania Ready to Negotiate War Claims ... 278
A WORLD of OIL ... Don Kliewer 282

NEW EQUIPMENT SECTION

What's New in Equipment ... 368
New Catalogs and Literature ... 381

DEPARTMENTS

Who's Meeting Where ... 72
Drilling Hints ... 286
Production Hints ... 299
Men in the Industry ... 306
Companies in the News ... 322
Association News ... 326
Service and Supply Men ... 333
Trading Post ... 359
Classified Advertising Page ... 359
Squeaks from the Bullwheel ... 360
ADVERTISER'S INDEX ... 382

WORLD OIL

Established 1916 as The OIL WEEKLY

a quick look at WORLD OIL this month

BUSY OIL MEN: To help you put first things first, scan these time-saving digests on this and the following pages, checking ☑ those you want to read first.

CURRENT OUTLOOK

☐ **Oil country casing and tubing** have been in tight supply for months. They are getting more scarce. No quick relief is in sight. For a roundup of this situation by WORLD OIL staff members, read . . . **Pipe Scarcity Threatens to Curtail Drilling** ..... **Page 82**

☐ **Several bills now before Congress** are unfavorable to business and reflect an apparent lack of understanding of business by the lawmakers and the public. Such bills point up the need for business to make itself understood. See **Page 86. Unfavorable Legislation Shows Why Business Must Make Itself Understood** .... **M. J. Rathbone**

☐ **The first quarter was favorable.** Earnings for 45 oil companies were 20.4 percent greater than in the first quarter of 1955. For results by companies, see **First Quarter Earnings Up 20.4 percent for 45 Oil Companies** ..... **Page 89**

☐ **The cost of crude oil** to the producer has increased sharply during the past decade. For some figures dating back to the $1.47-per-barrel in 1944, read **How the Cost of Finding and Producing Oil Has Increased** ..... **Page 90**

☐ **Union members are entitled to the safety valve** of a formal grievance procedure—by contractural right. But what about the non-union employe? For a thought-provoking discussion of the inadequacies of present "open-door" grievance procedures for non-union workers, turn to **Page 95. Who Is Listening to Non-Union Employes?** ..... **William S. Wilcox**

Turn the Page ▶

THIS MONTH . . .

☐ **For a searching insight** to what the company reports show for 1955, read this month's Changing Panorama on **Page 100. Independents Big Factor, Majors Jockey for Rank**.....**L. J. Logan**

☐ **Chances for higher U. S. crude prices were dimmed** somewhat during the past month as refiners made too much gasoline. As a result, motor fuel inventories became further out of line. The situation needs to be corrected by reasonable yields of gasoline during next 4 to 6 weeks. See **Page 105. Report from the Observatory**. **Ray L. Dudley and Warren L. Baker**

EXPLORATION ARTICLE

☐ **Madison reservoir performance** is discussed in the conclusion of this two-part article on North Dakota's Nesson Anticline. Refining, gasoline plant and pipe line facilities are pointed out. Turn to **Page 136. Madison Problems Are Unusual**.....**W. M. Laird and C. B. Folsom**

INTERNATIONAL ARTICLES

☐ **The Colombian government**—after 15 years of domestic litigation—has received control of the Carare, the southern part of the de Mares concession. And under an unusual agreement with the government's Empresa Colombiana de Petroles, Cities Service Corporation will begin active exploration in the area. **Cities Service Will Seek Oil in Colombia's Carare**....**Page 263**

☐ **Bolivia wants help** . . . the country is opening the door wider to permit unhampered private enterprise operations within its borders. That's what Bolivian Ambassador to the U. S. Victor Andrade says in an exclusive interview granted WORLD OIL. The ambassador emphasizes the major points of his country's new oil code and explains why the action was taken. See **Page 264. Bolivia Wants Help, Says Ambassador**... **Anthony Gibbon**

☐ **Final reports are near completion** on an aerial magnetic survey of WAPET holdings in Western Australia. For details on how the reconnaissance was carried out, turn to **Page 268. Australian Aerial Survey Reports Near Completion**.....**Harrison T. Brundage**

☐ **The Soviet cloak of secrecy** has been lifted from reports of a significant crude oil discovery in Austria's Matzen-Auersthal field. But the Iron Curtain has succeeded in stopping all but unsubstantiated details from reaching the West. However, since the Austrian petroleum industry has been liberated, WORLD OIL arranged for a detailed report on this major European producing area. See **Page 270. Matzen-Auersthal Called West Europe's No. 1 Field**.....**A. M. Stahmer**

WORLD OIL, published every month except semi-monthly in February and August. Entered as THE OIL WEEKLY as second class mail matter December 23, 1916, at postoffice at Houston, Texas, under the act of March 3, 1879.

Gulf Coast

GENERAL

☐ **After a decade of exploratory work,** hampered by both man-made and natural obstacles, the oil industry is now engaged in a highly significant large-scale-development of the Louisiana-Texas offshore areas. For a penetrating glance at the picture today, turn to **Page 78. Gulf Coast Offshore Development Successful**...**Ira H. Cram**

DRILLING

☐ **Here is a roundup of drilling mud practices** in use in the coastal areas, showing how drilling muds are treated in several of the problem-areas. Read what standard mud conditions are and how these muds are modified or changed completely as well conditions dictate. **Page 155. Gulf Coast Drilling Mud Practices Demand Attention to Special Problems**..... **Dr. George R. Gray, G. G. Allen and N. K. Tschirley**

☐ **The engine-electric rig** made its entry into the drilling field many years ago. But because of equipment bulk, slow operation, high maintenance costs and high initial investment, the electric-powered rig soon disappeared from the picture. Now the operator has the opportunity to buy newly-designed and streamlined packaged

PRODUCTION

☐ **One of the hottest spots** along the Texas Gulf Coast is Pierce Junction, a semi-developed area on the south edge of the City of Houston. Two years ago new drilling was at a virtual standstill here, now new locations and well completions are being made at a phenomenal rate. Turn to **Page 205** for the story of this Gulf Coast hot spot. **Pierce Junction Is Hottest Spot on Texas Gulf Coast—Charles Hoppins.**

☐ **The Miocene is responsible** for production in South Louisiana. To give production men an idea of how extensive it is and at what they have to shoot, a map of the stratigraphic sequence is included in this issue. It's an excellent reference for anyone with an eye on Gulf Coast activity. Read **How Deep Is Miocene Production in Southern Louisiana?**.....**Page 216**

Articles in This Issue

A multi-colored oil and gas map of the Gulf Coast area is inserted in copies of this issue going to subscribers in the Gulf Coast area. Others may obtain free copies of this map by writing WORLD OIL, Box 2608, Houston 1, Texas.

EXPLORATION

☐ **A familiarity with regional structural history** is an important geological tool in the finding of oil. For a look at these peculiarities on the Gulf Coast, turn to **Page 113. Gulf Coast Tectonics**.....**Dr. Max Bornhauser**

☐ **With interest in offshore activity** picking up, Florida State University has included underwater geological studies as a part of its geology curriculum. A "first" in the field of technical academic training, the program is paying interesting dividends after just two years of operation. For more about this interesting and important training program, turn to **Page 126. Geological Students Go Underwater**..**William F. Tanner**

engine-electric rig power plants. For a look at the situation today, turn to **Page 162. Diesel-Electric Rigs Making a Comeback**.....**E. E. Childress**

☐ **Operators of offshore drilling units** are turning to diesel-electric operation because of its flexibility of operation and equipment arrangement. But a continuing trend for onshore as well as offshore operations may be indicated by Sun Oil's purchase of a large diesel-electric for Texas-Louisiana operations. Turn to **Page 168. Are Diesel-Electrics Moving Inland?**.....
John N. Schuelke

☐ **Don't neglect the importance of weather** on safety and efficiency of offshore operations. More properly-manned weather stations with more frequent weather reports are recommended as a means of minimizing offshore hazards. Turn to **Page 176** for more information. **Weather Hazards in Offshore in Operations**....
Thomas F. Malone

☐ **Tropical storms and hurricanes** are menaces to offshore operations. Read how one company follows a definite procedure in securing the platform and tenders and evacuating personnel when the storm flags fly. **When Storms Threaten** ..... **Page 186**

☐ **In salt dome drilling,** the basic directional drilling methods are dependent on structure, location of target, correlation of target and casing program, well density and spacing, and mechanical limitations of equipment. Turn to **Page 192** for a discussion of these factors. **Directional Drilling for Salt Dome Oil Production**....**K. R. Joynt and A. H. Massad**

☐ **Metalizing is assuming an important position** in Gulf Coast corrosion prevention. Zinc-metalized wellheads dot the Gulf of Mexico and other applications are proving successful. Turn to **Page 220** for more about this method of corrosion control. **Metalizing Helps Lick Gulf Coast Corrosion**.....**F. W. Gartner, Jr.**

☐ **Too many dangerous conditions exist** in offshore electrical installations, according to the author of the article starting on **Page 226.** He says that lives and investments are being jeopardized by inadequate planning and poor maintenance. The answer? Experienced electrical engineers plus sound engineering standards and practices, he says. **Don't Short Circuit Your Offshore Operation**.....**O. E. Lundelius, Jr.**

☐ **A substantial increase in recoverable oil** in the chalk formations of Pine Island field of North Louisiana has resulted from the use of modern production methods and engineering techniques. These results may influence activity in other chalk areas of Gulf Coast. See **Page 240. Louisiana's Pine Island a Chalk Rock Proving Ground. C.R. Jordan**

☐ **A new cathodic protection jacket** is being developed which may extend the protective area to the vulnerable splash and tidal zones. In the past, cathodic protection has been confined to surfaces constantly submerged. If pilot tests on this new development are successful, Gulf Coast operators will benefit. Turn to **Page 250. Cathodic Protection Reaches Up to Cover Splash Zone—Maurice A. Riordan**

An editorial . . .

SYMBOLS OF INTEGRITY

THROUGH THE COURSE of years, a good many of our readers perhaps have noticed the two symbols which are displayed in the "masthead" of this publication. These designate our membership in two associations—are, in fact, "symbols of integrity." Their meaning to you, the reader, is both real and important.

The "ABC" symbol, for example, tells you that we are members of the Audit Bureau of Circulations; and, thus, that our subscription lists are audited and verified semi-annually by unbiased and competent auditors. In addition to guaranteeing to our advertisers a verified, completely honest circulation—this symbol also proclaims that all of our subscribers are treated alike . . . and treated fairly. Circulation sales methods are rigidly controlled and must meet the highest standards of the profession.

The "ABP" symbol signifies membership in our industry's trade association—the Associated Business Publications; a membership, incidentally, which is partially predicated upon our adherence to the circulation methods and ethics evidenced by our ABC membership.

The Associated Business Publications, celebrating its Golden Anniversary in 1956, has worked for 50 years to bring about the evolution of business-papers from their humble beginnings to the powerful force they are today.

As one of the 162 publications belonging to ABP, we pledge ourselves to adhere to a Code of Ethics and Standards of Practice which means, among many other important things, that we are working constantly to improve our services to our readers.

It is highly significant that the very first principle set forth in the Code of Ethics—adopted, incidentally, back in 1913—is *"To consider, first, the interests of the subscriber."* While everything contained in the Code and Standards of Practice is important to good publishing—and therefore publishing integrity—this initial principle is the one which gives the ABP symbol its real meaning to you, the reader.

As the Associated Business Publications celebrates its Golden Anniversary, then, we take this opportunity and this space to re-pledge our support of the high publishing principles for which it stands and to re-assure each and every one of our readers that we will ever *"consider, first, the interests of the subscriber."*

WORLD OIL

Specialized oil publications of THE GULF PUBLISHING COMPANY, 3301 Buffalo Drive, Houston 19, Texas; Box 2608, Houston 1, Texas. Cable Address: GULFPUBCO.

WORLD OIL and THE COMPOSITE CATALOG for the drilling-producing industry.

PETROLEUM REFINER and THE REFINERY CATALOG for the refining-natural gasoline-petrochemical industry.

PIPE LINE INDUSTRY and the PIPE LINE COMPOSITE CATALOG (first edition to be issued in July, 1957) for the oil and gas pipe line industry.

RAY L. DUDLEY.....President and Publisher
TOM W. NELSON.....Vice President-General Manager
R. M. deSOMBRE.....Vice President-Assistant General Manager
WARREN L. BAKER.....Vice President

EDITORIAL

Warren L. Baker, Editorial Director; W. B. Colvin, Associate Editor, Technical; L. J. Logan, Associate Editor, Economics; Don Kliewer, Associate Editor, International; Wallace Fitzgerald, Managing Editor; John N. Schuelke, Drilling Editor; John J. Robertson, Production Editor; Cecil W. Smith, Statistical Editor; Don E. Lambert, Management and Personnel Editor; Jack Cockerham, Presentation Editor.

District Editors: Gilbert M. Wilson, W. W. Wilson Building, Huntington Park, Calif.; Anthony Gibbon, Hunt Building, Tulsa 3, Okla.; Harrison T. Brundage, 250 Park Ave., New York 17, N. Y.
Editorial Assistants: Joan Frandolig, Mary Stuart Warren, Fern C. Reed.
Librarian: Eunice M. Okoneski.

ADVERTISING

D. S. Craig, Advertising Sales Manager. *Representatives:* NEW YORK (17): Nelson Bigelow, Gene Hart, George Skelton, 250 Park Ave., Phone YUkon 6-6558; CLEVELAND (15): Bill Westfall, Harvey Dunn, 1010 Euclid Ave., Phone MAin 1-3295; CHICAGO (4): H. G. Fitzpatrick, Martin Halloran, 332 So. Michigan Ave., Phone Wabash 2-9330; LOS ANGELES: Jay Curts, W. W. Wilson Bldg., Huntington Park, Phone Ludlow 7-1219; TULSA (3): Jim Isaacks, Hunt Bldg., Phone DIamond 3-1844; DALLAS (2): Ed Thompson, Room 518, Second Unit, Santa Fe Building, Phone PRospect 7344; HOUSTON (19): Charles Wyatt, William G. Dudley, 3301 Buffalo Drive, Phone JAckson 9-4301; EUROPEAN: Theodor Miocha, Agent, Limmerstrasse 31, Hannover, Germany, Phone 4-2935; UNITED KINGDOM: Frank Chambers, Agent, 120 Moorgate, London, E. C. 2, Phone Monarch 5661. Advertising rates on application.

SUBSCRIPTIONS

R. M. deSombre, Circulation Manager, P. O. Box 2608, Houston, Texas, U.S.A.
Single copies 50 cents (except special issues). Double prices for single copies more than one year old. Subscription price: domestic and foreign, $2 a year.
WORLD OIL published every month except semi-monthly in February and August. Copyright, 1956, by The Gulf Publishing Company.

Indexed by Industrial Arts Index Engineering Index

Looking Ahead . . .

. . . **The fever in the business boom seems to be coming down slightly.** Lagging of sales is showing up in some additional lines. Heretofore, declines were occurring principally in the automobile, residential construction, farm equipment and textile industries. They now are spreading to general retail merchandising, television, radio and other lines. Lumber production, shipments, and new orders lately have fallen short of year-ago levels. The steel industry has continued operating close to 100 percent of capacity. But according to some forecasts, steel mills may operate at only 90 percent of capacity throughout the second half of 1956.

•

. . . **Some economists heretofore have forecast a "rolling readjustment."** In it, they said, business as a whole would remain at high level. There would be only successive temporary let-downs for different individual industries. Now additional industries are faltering before previous cases have recovered. Some observers are beginning to wonder if the "rolling readjustment" is in danger of snowballing into a broad decline in industrial activity. (In the 1953-1954 readjustment the Federal Reserve Board index of industrial production dropped from 137 to 123, or 10.2 percent.)

•

. . . **The oil industry heretofore has escaped** any appreciable effect of the present business readjustment. Demand for petroleum has continued strong. Prices have been firm. Earnings have been good. There have been reductions lately in crude production and refinery runs. But they have been of seasonal nature. In the six months from May through October, each year, total demand for oil is less than in the heating season, from November through April.

•

. . . **Nevertheless, the oil industry ultimately will be affected** by developments in the general economy. The declines in business and employment in several important industries logically will at least flatten somewhat the growth in petroleum demand. Fewer automobiles produced and sold will mean fewer registrations and less gasoline consumption than if more cars were being sold. Lagging sales of farm equipment likewise will retard growth of gasoline use. Unemployment in automobile manufacturing and other lines will affect gasoline consumption adversely.

. . . **A new cause for inflation with its ultimate disastrous outcome has arisen,** warns the National Association of Manufacturers. It is the repeated raising of wages, under pressure of labor unions, even when raises are not earned by greater productivity, says NAM. The sequence is described. Higher wages cause higher prices. More money is necessary to handle business transactions. Government or the banks must supply the inflated volume of money. Otherwise there will be curtailment of activity and increased unemployment. So money supply again is inflated. The dollar is worth less. A new round of inflation begins.

•

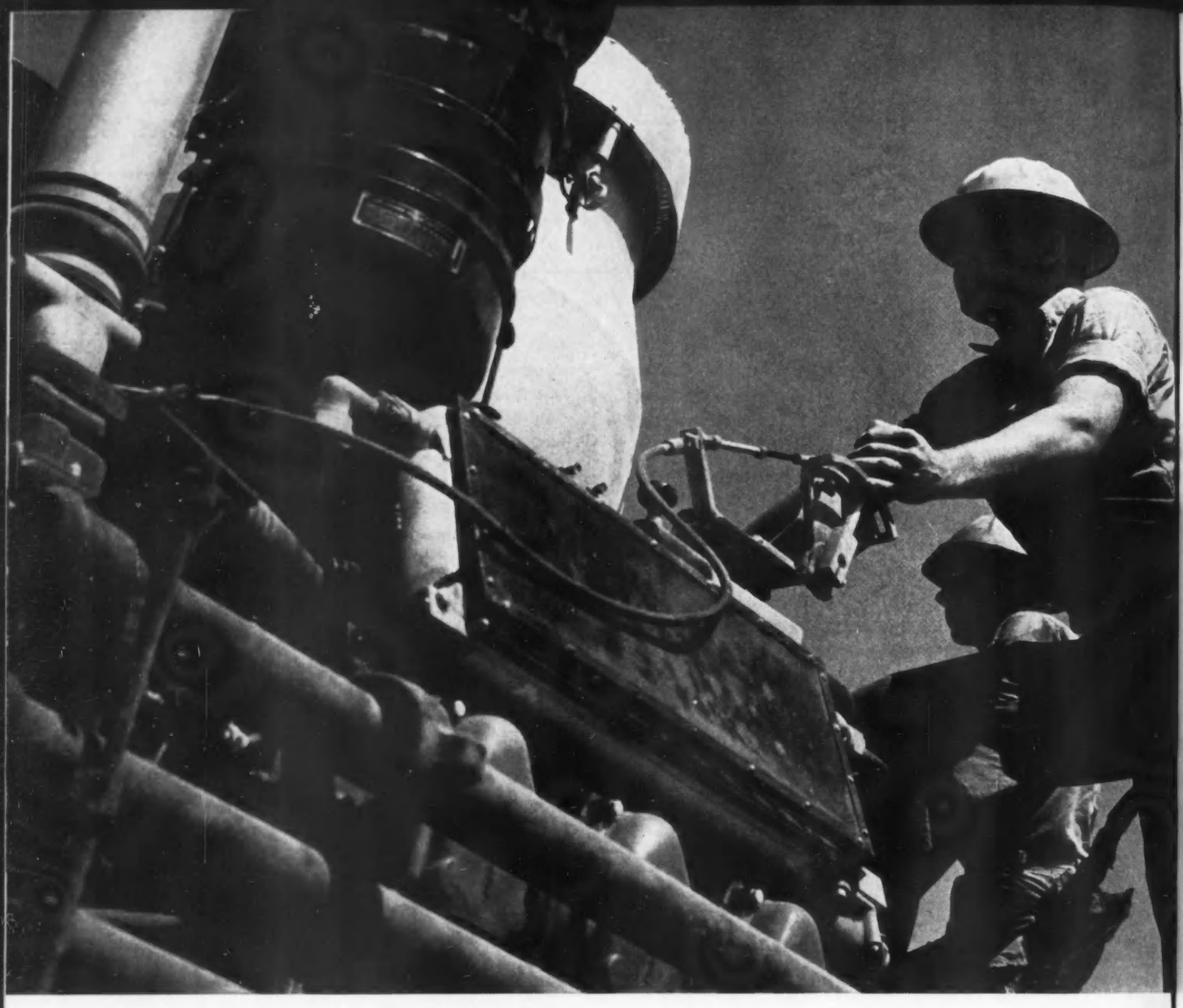
. . . **With the business boom now leveling out** and sales of numerous things lagging, industrial leaders will go slow this year on raising prices and on raising wages. Heretofore, sharp increases in steel industry wages and prices around midyear 1956 generally were taken for granted. Now they are not. Steel executives lately have appeared concerned about keeping prices in hand, despite their need for more income for expansion. They have indicated that in order to keep steel prices reasonable, they will bargain closely on future wage rates.

•

. . . **A further decline in allowable crude oil production in Texas has been scheduled for June.** The Texas Railroad Commission ordered June allowables averaging 3,261,251 barrels daily, a cut of 75,004 barrels from the May 12 allowable. The state's fields will produce for 15 days in June. Allowables were reduced also in April and May. The new quota is 203,567 barrels daily under the record high reached in March. Some purchasers advised only 14 producing days for June, and several recommended 13.

•

. . . **The Texas Railroad Commission declined to set June allowables as low** as some purchasers advised for several reasons. Olin Culberson, member of the commission, said he would not like to see further drastic cuts in domestic production while imports continue to increase. Importers had reported to the commission their intentions of bringing in more foreign oils than they previously had scheduled. Culberson also stated that stocks of crude in the U. S. were equivalent to only 30 days' supply and stocks of products 45 days' supply. In terms of days' supply, he said, these inventories were at the lowest levels in six years.



STRATAFRAC

DOWELL treatment fractures and acidizes in one operation for extra production boost

In a Stratafrac® treatment, advance-design Dowell equipment is used to pump acid-kerosene material into the pay zone to fracture and acidize in a single operation. Hydraulic pressure, suspended sand and acid all combine in an extra-powerful Dowell treatment designed to enlarge the well's drainage area . . . to increase permeability . . . to boost oil or gas production for you.

Yet down-time is short with Stratafrac. Liquid materials arrive at the well already mixed. Treatment is fast with minimum shut-in afterwards, and no gel breaker needed.

Stratafrac's unusual flexibility makes it effective in almost all types of formations. To match well conditions, Dowell engineers can vary acid and sand content, or add silicate control and clay dissolving agents. This double-action Dowell treatment has brought outstanding, *sustained* production increases to wells in almost every area.

For service, or for more information, call any of the 165 Dowell offices in the United States and Canada; in Venezuela, contact United Oilwell Service. Or write Dowell Incorporated, Tulsa 1, Oklahoma, Department F-13.

services for the oil industry

DOWELL

A SERVICE SUBSIDIARY OF THE DOW CHEMICAL COMPANY

Government Regulation Is Always Bad

Presidential veto of the natural gas bill has brought another U. S. industry under government control. The producers of natural gas are to be controlled as well as the gas transmission companies.

Therefore, it is fitting at this time to look into the question of how other businesses have fared when placed under government regulation. Railroads make an ideal subject. Since much of the nation's freight moves by railroad, they have a significant bearing on the prices people pay for most commodities.

•

Until the 1920's railroads had a monopoly on all long distance land traffic. Horses were their only competitor. As a monopoly they had been placed under government control. This monopoly ceased to exist long ago, but railroads continue to be run by the government.

Today, there are over 61 million automobiles, trucks and buses in the U. S. There are over 65,000 private and commercial airplanes, 175,000 miles of crude oil and petroleum product pipe lines, and approximately 15,000 inland waterway vessels. Each of these units, either occasionally or frequently, is a direct competitor of the railroads today.

Consequently, railroads now handle only 49 percent of all intercity freight. Trucks, pipe lines and inland water carriers handle the balance. Today 87 percent of all intercity travel is by private automobile, 5 percent by bus, and 3 percent by air, while only 5 percent is by rail.

•

The federal government continues to apply just as firm and resolute rules and regulations as it did 30 years ago although railroads ceased to be a monopoly long ago.

Railroads are not free to offer the public the lowest possible rates. They often are required to maintain rates higher than they desire. Lower rates might attract business from a competitor, and federal regulatory authorities are charged with the responsibility of dividing the nation's traffic among various types of carriers.

No form of transportation has a monopoly today. Consequently, the historic concept of U. S. free enterprise and equal opportunity should be applied to the transportation field. Each type possesses certain advantages in handling different kinds of shipments and traffic. Each type of carrier should be given the opportunity to do the best job. Otherwise, the public is being robbed.

•

American people travel over half a trillion miles annually. Their freight shipments amount to more than one trillion ton-miles of intercity traffic. The bill for this volume of travel and freight shipments is estimated at $50 billion yearly.

Such a huge expenditure obviously taps the pocketbook of every citizen. It is to the interest of the public that competition be permitted and even encouraged, so as to provide the best and cheapest means.

How can it be unfair to let all forms of transportation compete under open competition with one another, so long as a monopoly does not exist. Only the public and the railroads lose by unfair regulation of one type of transportation.

•

So it will be with the natural gas producing industry. The producers of this commodity should not be regulated, nor should competing fuels. The benefits of free competition should be passed on to consumers.

Furthermore, government regulation imposes large and unnecessary costs. Government bureaus must hire personnel, rent offices, etc. These costs must be paid for by higher taxes. To regulate gas producers, the Federal Power Commission must greatly enlarge its personnel. This will cost money.

•

Government regulation of any business does not pay. Neither the business, the country, nor the public benefits. The only reason for government regulation is in the case of monopolies.

Americans must wake up to this fact. They must start to fight for freedom before it is too late. Freedom in business is just as important to the U. S. as freedom of religion, freedom of speech, or any other freedom.

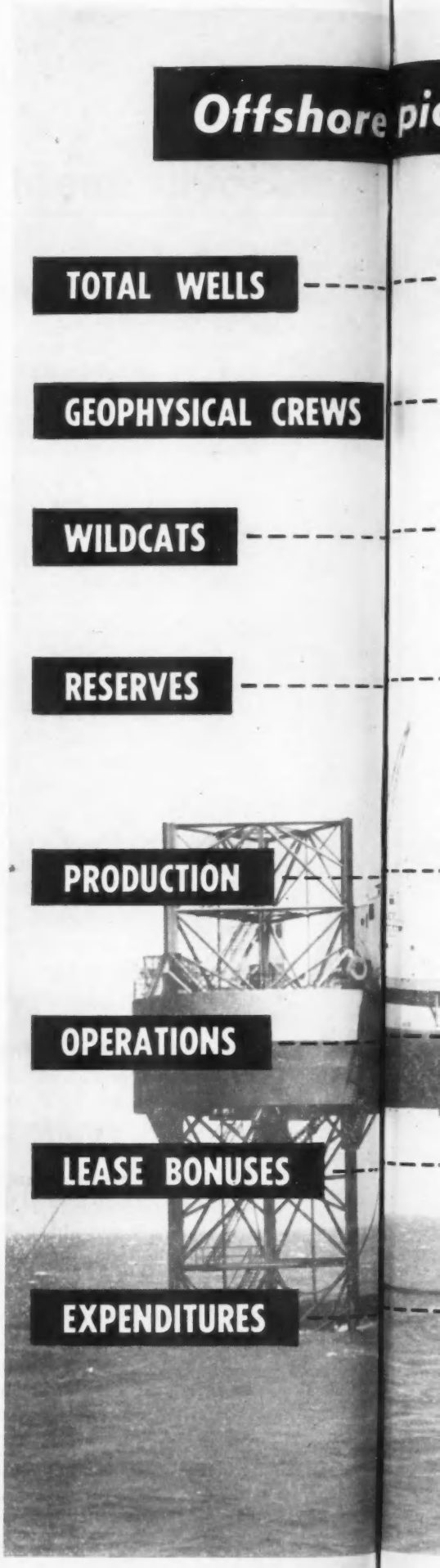
Warren L. Baker

A Gulf Coast Feature . . .

Offshore Development Proving Successful

• After a decade of exploratory work, hampered by both man-made and natural obstacles, the oil industry is now engaged in a highly significant large-scale development of the Louisiana-Texas offshore areas.

• This article and the Quick-Look information at the right sums up the picture as the industry heads into what promises to be a record-breaking year for offshore operations.



By IRA H. CRAM
Senior Vice President
Continental Oil Company, Houston

RESULTS OF Louisiana and Texas offshore exploratory drilling have been outstanding—even phenomenal. Seismographs made their appearance in the Gulf of Mexico off the coast of Louisiana in 1944. They soon discovered piercement salt domes, deep seated domes and less prominent structural features. There proved to be about as many of these oil and gas prospects per square mile as on shore. The offshore was just more onshore covered with water.

As of January 1, 1956, a total of 155 wildcat wells had been drilled on 101 prospects off the shores of Louisiana and Texas. They proved the existence of 64 oil and gas fields. Forty-one percent of the wildcats had produced. Eleven percent is the national average.

Enough development drilling has not been done to prove the quality of most of the discoveries. However, some now appear to be second raters —opened by mistake. Some others are definite giant fields, with expected ultimate recovery of over 100 million barrels each.

Perhaps 1.5 billion barrels of crude oil and 10 trillion cubic feet of natural gas have been discovered.

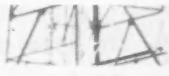
What about the 37 prospects that did not produce? Many geologists will say that all 37 eventually will produce hydrocarbons in some quantity. Furthermore, many other prospects outlined by geophysics have not been drilled or even leased. Other prospects will become apparent as drilling reveals more and more subsurface infor-

picture at start '56 . . .

Approximately 800 wells completed. 79 wells drilling, 70% more than a year ago.

44 geophysical crews in operation, 42% more than at the start of 1955

Total drilled: 155 on 101 prospects. Productive: 64 or 41% of total (Only 11% of all U. S. wildcats produce.)

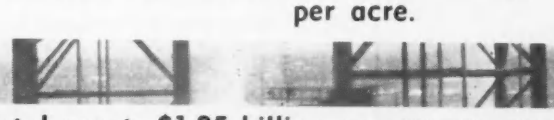


In the 64 oil and gas fields found, perhaps 1.5 billion barrels of oil and 10 trillion cubic feet of gas had been discovered. The oil fields include some giants that might yield 100 million barrels each.

Crude oil production: 92,550 barrels daily (99% off Louisiana), up 96% from one year earlier. Natural gas: 390 million cubic feet per day (all off Louisiana), up 23% from start of '55. Forecast for 1960: 400,000 barrels of oil and 2 billion cubic feet of gas per day.

At least 46 operators had purchased leases. About 35 had interests in wells drilled or drilling.

Average is close to $400 per acre. Range is up to $2000 per acre.



Total spent: $1.25 billion, vs. revenue received of $0.25 billion, leaving deficit of $1 billion. Spending: $18 million monthly, excluding lease bonuses and rentals, vs. half that much monthly gross income.

mation. So explorers look upon the offshore as prime hunting grounds.

The prospective area is a large one, with 28,000 square miles off Louisiana and Texas in water no deeper than 120 feet. Over half of this area is off the coast of Louisiana—an area about one-third the size of Louisiana.

Some day there will be drilling in deeper waters. If it ever becomes economic to drill in water as deep as 600 feet, the entire Continental shelf becomes prospective. The hunting grounds then will embrace almost 50,000 square miles off Louisiana and Texas. That is an area slightly larger than Louisiana.

Furthermore, when it becomes more profitable to produce petroleum below 15,000 feet, most of the deep hunting grounds in the U. S. will be in the coastal areas of Texas and Louisiana. In fact, the area of 28,000 square miles just mentioned comprises about 9 percent of the deep hunting grounds.

The petroleum industry thinks evidence points to offshore Louisiana being the more attractive. One observer, the oil department of the Chase Manhattan Bank, ventures the opinion that the Louisiana offshore eventually will produce 10 billion barrels of oil, and that the Texas offshore will produce one-fourth to one-third of that amount.

The petroleum industry has never known in advance the ultimate reserve of any area and has cared less. As along as profitable oil and gas fields are being found in a given province and undrilled prospects exist in the minds of men, this venturesome industry will explore that area vigorously.

The geologist will say that he can put his finger on a number of oil or gas fields with more assurance offshore than in any place in the Western Hemisphere, perhaps in the world. Results of exploratory drilling and existence of a number of undrilled prospects generally considered to be first class are intoxicating.

But will the cost of finding and producing offshore hydrocarbons permit them to compete with other sources? There is talk of million dollar wildcats, million dollar platforms, expensive underwater pipe lines, as well as multi-million dollar drilling barges and multi-million dollar lease bonuses. One may well wonder if

anybody is going to make any real money.

The answer is easy if one has faith that the petroleum industry will continue to do the impossible. In the case of the offshore, the petroleum industry has a backlog of 50 odd years of experience in learning the geological tricks and drilling and production peculiarities of Gulf Coast fields. Offshore fields are of the same breed. Such knowledge is invaluable. But marine operations in a hurricane belt present additional problems. They offer perhaps more than the usual batch of new problems accompanying the development of a new area.

Actually, all problems boil down to one—the problem of doing everything more cheaply. Geophysical costs came down when several crews working for different organizations tackled the problem on a large scale. Now that large scale drilling and producing operations are under way, improvements are bound to appear all over the offshore. Each improvement has the habit of spreading throughout the various organizations, suggesting and causing further improvements. Expanding activity generates new know-how.

Spurred on by a fine discovery record, the petroleum industry and supply-and-service industries are working night and day. They are sparing neither expense nor talent to insure that these hydrocarbons will be made available at reasonable cost. Real progress is being made, collectively, by geologists and geophysicists, petroleum engineers, construction engineers, automation engineers, marine engineers, corrosion engineers, drilling experts, marine and air transportation specialists, practical operators and a host of others. Another exciting chapter in what-makes-America-tick is being written.

Actions of the petroleum industry speak far louder than testimony. At the beginning of this year it is estimated that the petroleum industry had plowed $1.25 billion into the offshore and had received in revenue less than $.25 billion, leaving a gross deficit of over $1 billion.

Monthly expenditures, exclusive of lease bonuses and rentals, now total approximately $18 million. Monthly gross income is about half that. About 800 wells had been completed, and 79 wells were drilling, 70 percent more than on January 1, 1955. Forty-four geophysical crews were in operation, a 42 percent increase over January 1, 1955.

The following figures are probably inaccurate, because it occasionally is difficult to learn who owns what interest in a lease or well. Anyway, it is reported that at least 46 industry units, large and small, have purchased leases, and 35 have interests in wells drilled or drilling in the Gulf. Every week there are reports of other operators going in or considering the plunge.

Apparently not just industry giants believe they can make an honest dollar in the offshore. Also, these believers in its ultimate profitability are not limited to those pioneer operators who got there first with cheap $5 leases. Operators, large and small, pioneers and newcomers have participated in recent sales where lease bonuses averaged close to $400 per acre and ranged up to $2,000 per acre.

All these actions, and others too, indicate that a fair cross section of petroleum operators expect reasonable unit costs in the long run. They are, therefore, willing to make staggering capital expenditures. Naturally, numerous partnership arrangements have sprung up. In this risky exploration business it is always prudent to spread one's bets. This can be accomplished best through partnership when capital requirements are high.

The oil supply which these intrepid operators will make available is of inestimable national importance. In the U. S. a steady increasing demand has been supplied largely from domestic sources only through continuous discovery of new fields and new pools in old fields. It is hard to find one sound reason why the industry should not continue to make the supreme effort to supply demand largely from domestic sources as long as new fields and new pools exist that can be found and produced economically.

So, discovery has been and will continue to be the continuing business of the petroleum industry. Traditionally, there is worry—too much or too little has been discovered. Periodically, a new area is needed which will provide a number of major fields. Results in the last few years highlight the need for such a new area today. The offshore is it.

Of course, the offshore is not the last. Others will come along in due time.

The American public's voracious appetite for both liquid and gaseous hydrocarbons shows no signs of decreasing. Barring economic and political upheavals, one may expect domestic demand in 1965 for petroleum liquids and natural gas 50 percent greater than the present demand. If such a demand materializes, and if present ratio of net imports to domestic production is maintained, far more petroleum shall have to be found in this decade than in any previous decade. Perhaps, as much as has been produced since the Drake well, or approximately 55 billion barrels of petroleum liquids and over 180 trillion cubic feet of natural gas shall have to be discovered.

It will take many new giant fields in addition to the smaller ones that are being found every day to develop any such supply, or a supply of half

About the Author

IRA H. CRAM, who has served as secretary-treasurer and as president of the American Association of Petroleum Geologists, was awarded his master's degree in geology at the University of Minnesota. Joining the Pure Oil Company at Tulsa as a geologist in 1924, he became division geologist, assistant chief geologist, and in 1948 manager of exploration for Pure. Cram became associated with Continental Oil Company as vice president and manager of exploration in 1949 and was elected a member of the board of directors in 1952. In 1953 he was named senior vice president.

that size. Again, the offshore is one area with such potentialities.

Production record. Last December offshore production of crude oil averaged 92,550 barrels a day, of which 99 percent was from offshore Louisiana. That was 96 percent increase over December, 1954. Offshore production of natural gas exceeded 390 million cubic feet per day in December, all from offshore Louisiana. That was a 23 percent increase over December, 1954. It would not be surprising if the average daily offshore production during 1960 exceeds 400,000 barrels per day of petroleum liquids and 2 billion cubic feet of natural gas.

Performance of the petroleum industry thus far offshore is creditable, to say the least. It was achieved in the face of man-made as well as natural obstacles. At times it has seemed that man is trying to outdo Mother Nature in the game of throwing roadblocks in front of the offshore operators.

During the Tidelands debate was heard the cry of "give away." But every oil man knew that if there was a "give away" he was not the recipient. After too many years of this costly slowdown, legislation was finally passed that enabled the petroleum industry to get going again.

Then came another jolt in the form of the Supreme Court's decision in the Phillips natural gas case and subsequent failure to pass corrective legislation. This last roadblock—the gas dilemma—is exceedingly serious because 36 of the 64 offshore discoveries promise to be natural gas fields rather than oil fields.

Thus, sustained, orderly development of a most important natural resource has to date been prevented. Instead, the petroleum industry has been forced to operate in spasms—a far less effective and more costly way to explore for and develop oil and gas fields.

Exploratory momentum was lost during each slowdown. Each delay stretched out the payout period, so that income on huge investments was postponed. This is expensive and devitalizing. And perhaps even more costly, the development of know-how was set back several years.

Operators are willing to make the necessary capital outlays, staggering as they are, because they expect reasonable unit costs in the long run. They will continue the development if they are not further hampered by adverse rulings and legislation. A less vigorous industry cannot get the job done as it should be done. It is not too much to expect governmental cooperation and cooperation of the public in combating instances of governmental non-cooperation.

Allowables. An allowable may be defined as a well's just and equitable share of the authorized production of a pool which can be produced subject to the reasonable necessities for the prevention of waste. Offshore operators are entirely in line when they expect agencies that determine allowables to grant to offshore operators maximum allowables consistent with sound conservation practices.

Maximum allowables will provide a more adequate income and, consequently, an earlier and more adequate return on enormous capital outlays, thereby encouraging further exploration and development of the offshore.

Percentage depletion periodically comes under attack. This is an involved subject in the field of taxation poorly understood by too many people. But one does not have to understand thoroughly all the arguments for and against to be an advocate of percentage depletion. One needs to understand just one fact—it works. It supplies an incentive to explore for petroleum that is superior to any other incentive scheme thus far proposed.

It takes a multitude of operators, little and big, dreaming up a multiplicity of ideas, and with adequate incentive to spend their own cash on these ideas, to find oil in quantity, particularly in the U. S. Without this incentive the thousands of long gambles—the offshore is one of them—that have built our petroleum supply would not have been taken.

Reduction or abolition of the incentive would simply reduce the number of gambles that would be made. The inevitable result would be diminished supplies in the face of rising demand. Diminishing supplies in a troubled world are not in the interest of natural defense.

Percentage depletion has proved to be, in effect, an exploratory tool, and an effective one, just as the seismograph is. To reduce or abolish it makes as much sense as reducing the number of seismographs or forbidding their use altogether by government edict. —**The End.**

Offshore Oil and Gas Map

A large-scale multi-colored map of the Texas-Louisiana Gulf Coast area is inserted in copies of this issue of WORLD OIL going to subscribers in that region. It covers the offshore area and adjacent inland territory. The map shows such features as oil and gas pipe lines, oil and gas fields, and offshore lease ownership. Subscribers not receiving maps may obtain one free of charge by writing WORLD OIL, Box 2608, Houston 1, Texas.

A WORLD OIL staff report on a current serious problem confronting the oil industry.

Pipe Scarcity Threatens to Curtail Drilling

Supplies of oil country pipe and tubing are very tight and getting tighter. Operators may be unable to get enough to drill all the wells they want to drill in 1956 and 1957.

By L. J. LOGAN, ANTHONY GIBBON and GILBERT M. WILSON
WORLD OIL Staff

U. S. OPERATORS may be unable to drill all the wells they want to drill in 1956 and 1957, because of a shortage of oil country pipe and tubing.

Steel casing and tubing have been in greater demand than supply for months. They apparently are due to remain hard to get through this year and probably into 1957.

In order for operators to increase drilling in coming years as sharply as in recent years, production of tubular goods would have to be expanded more greatly than it has been expanding last year and this year. Prospective expansion of pipe making capacity apparently may be inadequate to provide all the pipe wanted.

Large companies as well as small operators now say that the number of wells they will drill in 1956 may be less than they have programmed, because of inadequate supplies of casing and tubing.

All Pipe Scarce. All sizes, kinds, and grades of oil country pipe and tubing are scarce and getting more critically scarce. Supplies are on allocation by all companies, although the mills are operating near 100 percent of capacity.

Old and steady customers naturally are accommodated in so far as possible. New customers and independent operators without histories of previous purchases are having difficulty in getting pipe, as might be expected.

There appears to be no shortage in plant facilities and capacity for welded and line pipe types of pipe. However, there exists a basic shortage of the sheet or plate needed for those grades of pipe.

Drill pipe likewise is fairly well available in quantities needed. It can be used repeatedly, in contrast with casing, which is cemented permanently in a well.

Casing and tubing are scarce throughout the country. Stocks are very low. The second hand pipe market is booming.

Operators continue to drill their wells. But they are careful to check their requirements for weeks and months ahead. This is especially true for the larger operators, who are in position to outline annual programs. The independents get their pipe wherever they can.

No black or grey market in tubular goods is reported. Operators generally report full cooperation on the part of the steel mills.

Causes of Shortage. The scarcity of oil country pipe and tubing has been caused by various things. Basic steel has been scarce in 1955 and 1956, in spite of capacity operation of mills. Supplies available for making pipe have been limited. Facilities for making steel into tubular goods have been operated near capacity without fully satisfying the rising demand.

The demand for pipe has been boosted by certain developments in the oil industry. The need for pipe has increased out of proportion to the increase in number of wells drilled. The wells are getting deeper on average and involving relatively more footage than formerly. The deeper wells involve higher pressures and higher temperatures. They require heavier casing and casing with greater strength, obtained by use of alloys. More tonnage of pipe is needed per 1,000 feet of hole. A given amount of tonnage of pipe takes care of less footage and fewer wells than formerly.

Table 1 offers a partial explanation why pipe is now scarce. The amount of footage drilled in the U. S. in 1955 was 8.4 percent greater than in 1954. But production of oil country pipe and tubing expanded only 2.7 percent in 1955. The amount of pipe produced in 1955 was down to 10.8 tons per 1,000 feet drilled from 11.4 tons in 1954. This decrease occurred although the need was for an increase in tonnage of pipe production per 1,000 feet of hole drilled, due to deeper wells and other reasons.

Stockpiling, Too. On top of the ris-

TABLE 1—Production of Oil Country Pipe and Tubing Expanded Only 2.7% in 1955, While U. S. Footage Drilled Increased 8.4%

Only 10.8 tons of pipe were produced per 1,000 feet drilled in 1955, compared with 11.4 tons per 1,000 feet in 1954. This decrease occurred although deeper wells are causing need for more tons of pipe per 1,000 feet drilled.

YEAR	Footage Drilled		Production of Oil Country Pipe and Tubing		Tons of Pipe Produced per 1,000 Feet Drilled
	Thousand Feet	Percent Gain Over Year Before	Net Tons	Percent Gain Over Year Before	
1946	101,125	....	1,094,962	.....	10.8
1947	112,816	11.6	1,410,309	28.8	12.5
1948	136,709	21.2	1,709,523	21.2	12.5
1949	138,617	1.5	1,512,962	—11.5	10.9
1950	159,762	15.3	1,746,979	15.5	10.9
1951	176,757	10.6	1,897,751	8.6	10.7
1952	188,378	6.6	1,610,545	—15.1	8.5
1953	198,432	5.3	2,066,988	28.3	10.4
1954	211,296	6.5	2,412,849	16.7	11.4
1955	228,990	8.4	2,478,217	2.7	10.8

Sources: Pipe production from American Iron and Steel Institute; footage figures compiled by WORLD OIL.

Tubular Goods Situation and Outlook

Pipe is scarce because of more drilling, deeper wells, and advance buying. Production is increasing but not as sharply as demand. Scarcity through 1956 and into 1957 is indicated.

DEMAND EXCEEDS SUPPLY

Casing and tubing of all sizes and grades are in greater demand than supply. Seamless pipe is particularly hard to get. Stocks are very low. The second-hand pipe market is booming. But no black market or grey market in tubular goods is reported.

ENOUGH DRILL PIPE

Line pipe and drill pipe are in better supply. However, new supplies of those products will be subject to availability of basic steel. The steel mills remain hard pressed to keep abreast of total steel demand.

NO EARLY RELIEF SEEN

No early relief from the shortage of oil country pipe and tubing is in sight. Pipe making capacity is being expanded somewhat. But not in line with sharply increasing oil industry requirements.

STREAMLINING MILLS

More pipe mill capacity is being gained largely by streamlining existing facilities. Mills are adding pipe threading machines and other units to boost pipe output.

DRILLING UP MORE SHARPLY THAN PIPE PRODUCTION

The number of wells drilled has been increasing greatly. Footage drilled has increased even more sharply, due to greater average depths. Production of tubular goods has not expanded in proportion to the increase in footage drilled.

DEEP WELLS EAT UP SUPPLIES

Deeper wells accentuate the pipe scarcity. The deeper wells require heavier and stronger casing and more tonnage of pipe per 1000 feet. The heavier pipe is needed because of higher pressures and temperatures.

BUYING FOR INVENTORY

The pipe shortage apparently has been accentuated by advance buying. Stockpiling has been based on expectations of a possible steel strike and increases in steel prices. Buying for inventory may decline after mid-year, putting supplies in better balance with demand.

STORING EARLY NEEDS

Some pipe is being stored at different locations where it will be needed for programmed drilling. It must be classed as working inventory, not stockpiling.

REGULAR INVENTORIES

Major companies and independent operators commonly try to keep 3 to 5 months' supply of pipe on hand to avoid costly interruptions of drilling operations.

ing demand for pipe and the mill limitations on making it, trouble in balancing supply and demand has been accentuated by stockpiling of pipe by operators. Purchases have been made in advance of need for pipe. Advance buying has been caused by the threat of a steel strike at mid-year, 1956, and possible stoppage of steel production. Buying for inventory has been caused also by the general expectations of increases in prices of steel products around the middle of the year.

There has been some storing of pipe in addition to that caused by the threat of a steel strike and higher steel prices. Some companies have been storing pipe at different locations where it will later be needed to carry out drilling programs. Operators cannot afford to start wells that cannot be completed for lack of pipe. They are therefore acquiring the pipe needed and storing it at convenient places to be sure to have it soon enough when needed.

Both major companies and independent operators commonly want to keep their inventories of pipe equal to their requirements for three to five months, according to a representative of a supply company. They apparently need such inventories at all times in order to maintain drilling operations without costly interruptions.

Although stockpiling has helped to make pipe scarce, the inventories could be a factor in a better supply situation in the third quarter. If and when prices are increased, the inventories will be used, and slower purchases will make more supplies available.

Meanwhile, some new steel-making and pipe-making capacity are being provided. Some further expansion of production can be thereby achieved.

It seems possible, therefore, that there may be some relief in the pipe scarcity after the middle of this year, to the extent that stockpiling of pipe is involved. Nevertheless, the other factors previously discussed indicate that the supply of pipe may remain inadequate for an indefinite period.

Scarce Items. Tubular goods now particularly scarce include 20 inch conductor pipe, of which offshore wells require 600 to 800 feet each; 8⅝ inch and 9⅝ inch casing, long strings of which are used in South Louisiana's deep wells; 5½ inch o.d. casing; N80 and P105 grade tubing; N80 and P110 grade tubing; and J-55 tubing. Seamless pipe is generally scarce. High alloy steel pipe is in greater demand than supply. Within the past 1½ years, demand for alloys has jumped from 30 to 50 percent of customers' requirements, according to one steel company representatives. He said the ratio is now half and half for carbon steel and alloy steel.

Tubing has become critically scarce. One of the important reasons is the large amount of it now being used in deep wells, especially in South Louisiana. Many wells previously completed conventionally are now being duel completed or triple completed. One well over 10,000 feet deep used 35,000 feet of tubing.

Deep Wells Use Much Pipe. Since more wells are being drilled and average depths are increasing, more pipe is being buried in the ground. Deep wells in South Louisiana often require 475 to 500 tons per well. Strings of 11,000 to 13,000 feet of heavy, high strength 9⅝ and/or 7⅝-inch casing, along with several thousand feet of liner per well have become commonplace. Two South Louisiana wells, each over 14,000 feet deep, were to be completed with two strings of casing each, and it was figured that they would require 610 tons of pipe per well.

World's Deepest Oil Well. The South Louisiana well recently completed by Richardson & Bass et al as the world's deepest producer (from perforations at 21,443-465 feet) has in it five strings of pipe, varying from 20 inch to 5 inch. All the pipe placed end to end would reach 11 miles. The weight of all the pipe is here estimated at about 1055 tons. That amount is equivalent to the tonnage of steel in 47 wells in Duval County, Southwest Texas, each about 2300 feet deep and using 22½ tons of pipe.

The record well in South Lousiana employed 302 feet of 20 inch casing, 3004 feet of 13⅜-inch, 13,656 feet of 9⅝ inch, 19,752 feet of 7 inch, and 21,800 feet of 5 inch, a total of 58,514 feet or 11 miles of pipe. A representative well for Duval County recently used 231 feet of 10¾-inch casing, 2,260 feet of 5½ inch casing (plugged back to 2070 feet and perforated at 2,040 feet) and 2,023 feet of 2⅜-inch tubing, a total of 4,514 feet, or less than ⅞ of one mile of pipe. The South Louisiana deep well required relatively heavy grade pipe and the Southwest Texas shallow well comparatively light weight pipe.

The tonnage of steel used in the world's deepest producing well, in South Louisiana, was over one tenth as great as that used recently in building the huge bank and office building of the Bank of the Southwest in Houston. The estimated 1055 tons of steel in the record well compared with about 10,000 tons used in the bank building. That structure covers a whole city block for several stories and rises in a tower to 24 stores, affording 825,000 square feet, or 19 acres, of floor area.

Future Supply. No definite or early alleviation of the pipe shortage is in sight, although some additional pipe producing capacity is being provided. A new steel mill is under construction in Canada. In the U. S. most of the mills are streamlining their existing facilities to achieve increases in capacity, adding threading machines and other equipment.

Youngstown Sheet and Tube Company is building a mill to fabricate seamless pipe at Indiana Harbor near Chicago. It is expected to produce 300,000 tons a year, and is due to be in operation in 1957.

To meet demands for tubing, Youngstown, Jones & Laughlin, Republic Steel, Colorado Fuel and Iron, and Lone Star Steel are installing reducing mills to make 2-inch and 2½-inch light wall tubing from 6-inch heavy wall tubing.

These facilities, it is believed, will come close to meeting the immediate shortage of tubing in these sizes. No figures are available for use here as to individual capacity of each of these new additions, which are expected to be in full operation by 1957.

The new facilities also will permit an increase in the manufacture of casing and drill pipe. They will relieve existing mills from the necessity of diverting casing manufacturing capacity to tube fabrication.

These additions will go a long way to relieve the situation. But in spite of them, the oil industry faces continued shortages of tubular goods. This is indicated in view of the predicted 80,000 wells to be drilled annually by 1965 and the increasing number of deep wells.

Steel Industry Expansion. The

steel industry is expected to add 15 million tons a year of new capacity to steel production in the next three years. But it still will not be able to keep up with the demands of the oil industry if the trend toward more drilling and greater depths continues.

A specific example of the proposed increase in steel production is Bethlehem Steel's recent announcement that it will increase its steel capacity another three million tons. That will bring its total steel capacity up, within two years, to 23 million tons a year.

Continued, basic increases in steel mill and plant capacity probably is the only long range answer to the steel goods shortage. If a plant were to start expansion plans tomorrow, it would be a couple of years or more before its output would be felt. Meanwhile, if previous trends continue, the national consumption would continue to increase at rapid rate, using up the extra producing capacity as soon as available.

The steel industry has a hard problem as regards the steel scarcity. Further expansion of plants will be needed to meet the indicated greater steel demand of the future. But expansion henceforth will be extremely expensive. It is getting harder to gain more capacity by enlargement and modification of existing plants, following extensive streamlining of the past. Entirely new plants are needed. They will cost very heavily and require much time to build. Steel from expensive new plants will have to bring higher prices to be profitable. Financing of new facilities will be a problem.

Reserves accumulated through depreciation of old, low-cost plants provide only a fraction of the high cost of new plants. The additional funds needed must come from current net income after taxes. Revenue to provide adequate funds for expansion after paying heavy taxes can be generated only by relatively high prices for steel products.

Steel industry leaders say that two things are needed to assure steel industry expansion and adequate steel supplies.

1. Tax laws should be changed to allow deductions equal to high replacement costs instead of the low actual costs of the past.

2. Prices of steel should be raised enough to provide reasonable profits, from which funds for new plants can be raised. —**The End**

STORY ABOUT A STORY

REMEMBER the article on recruiting college graduates for oil industry service in the April WORLD OIL? It was a sample of the constructive articles WORLD OIL likes to publish and apparently colleges and oil companies liked it, too. More than 50 oil companies and colleges have asked for nearly 400 reprints—and requests are still coming in. Here are samples of their comments:

". . . We have found it very helpful . . . please send 12 additional copies."

E. A. Lewis, Supervisor of Employe Relations
Gulf Oil Corporation

". . . We should like very much to receive 50 copies for distribution to our recruiters in our four divisions and the General Office."

R. E. Fry, Employment Supervisor
Stanolind Oil and Gas Company

". . . We would appreciate receiving 30 additional copies of this reprint. . . "

A. J. Alstrom, Division Manager of Personnel
Standard Oil Company of California

". . . Your article, 'Employing the College Graduate,' is the best summary I have seen to date on the recruiting situation. I would appreciate copies of the reprint sent to the following. . . "

Lewis M. Knebel, Placement Director
University of Maryland

". . . The article represents an important study I wish to place in the hands of a number of people on our campus."

G. W. Diemer, President
Central Missouri State College

". . . It has been read with a good deal of interest. So that I may distribute this article to several of our departments, I would appreciate your forwarding to me 15 additional copies."

D. A. Sedgwick, Assistant to Vice President
Industrial and Public Relations Dept.
The Texas Company

". . . We enjoyed reading your recent article . . . if possible, we would appreciate your sending us 15 copies for distribution to our Division Employe Relations Advisors."

C. E. Duran, Supervisor-Employment
The Carter Oil Company

". . . We deeply appreciate the service your organization has rendered to us all with reference to wise placement procedures."

W. R. White, President
Baylor University

". . . You are to be congratulated for providing this information to both colleges such as ours and oil companies interviewing on our campus."

Phillip C. Worden, Head, Placement Bureau
New Mexico Institute of Mining & Technology

". . . I would like to request that 20 additional copies be forwarded to my attention if they are available. It is our intention to mail reprints of this article to our college recruiters throughout the country."

L. W. Armon, Employment Supervisor
United States Rubber Company

Unfavorable Legislation Shows Why Business Must Make Itself Understood

Several proposals now before Congress are unfavorable to business. They emphasize need for better understanding of business by lawmakers and public. Business should and can make the truth known.

By M. J. RATHBONE, President
Standard Oil Company (New Jersey)
New York City

SOME PENDING legislation in the present Congress would hamper lawful business mergers, establish cruel and unusual punishment, and use the government's taxing power to penalize business growth.

These measures emphasize the need for businessmen to make themselves better understood among legislators and the public.

There is still a mass of misconception about how business really operates. Misunderstanding could so shackle American business that it would be unable to make an effective contribution to the national welfare.

Examples of the lack of understanding of business may be found in many areas. But when they are discovered at the very heart of our democracy, in the U. S. Congress, it is time to pay them some heed.

Consider the potential effects upon business of a number of bills actually before the 84th Congress. Some of this pending legislation should be enough to shock any businessman out of his complacency.

Anti-Trust Bill. H.R. 9424 was recently passed by the House. It is intended to aid the Federal Trade Commission and the Department of Justice in enforcing what is popularly known as the "Anti-Merger" law. This law, a section of the Clayton Anti-trust Act, prohibits mergers of corporations when they might have an adverse effect on competition. The new bill passed by the House would require companies of a certain size to give two governmental agencies advance notice of any merger with, or the purchase of any stock or assets from, another company regardless of the effect of the deal on competition. Briefly, the bill:

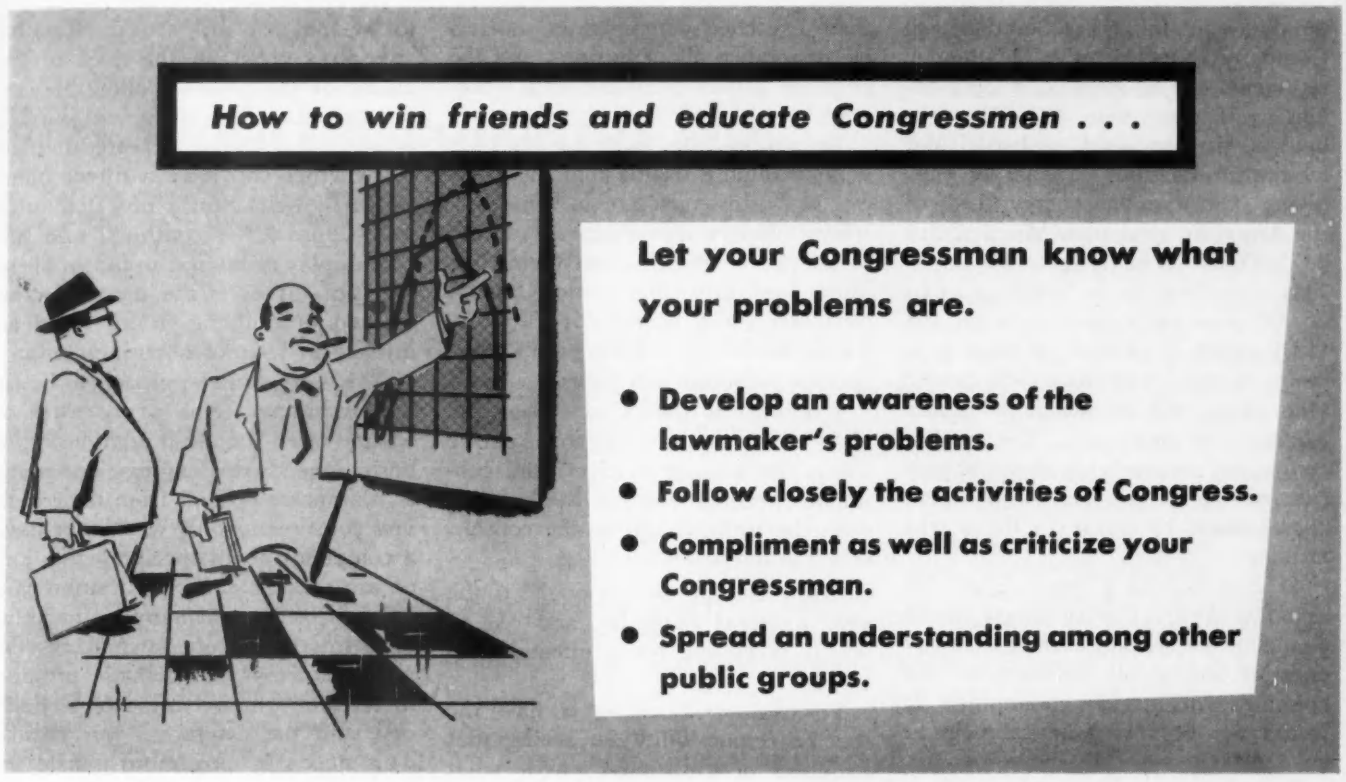
- Requires all corporations planning mergers to give the Justice Department and the Federal Trade Commission 90 days advance notice in those cases where one company proposes to acquire the whole or any substantial part of the stock or assets of another company and where the combined capital, surplus, and undivided profits of the two companies exceed $10 million; and
- Halts all proposed mergers for the 90-day period, so that the Department of Justice and the Federal Trade Commission may investigate the case; and
- Requires, under heavy penalty for default, the corporations involved to provide any information that the government agencies feel they may need.

The bill also provides that failure by the government to object to the deal within the 90-day period "shall not bar the institution at any time of any action or proceeding with respect to such acquisition under any provision of law." So after meeting the requirements of the law, the sword of Damocles would still hang over the businessman. Even though the government concludes that the deal is lawful, the businessman is not given any expression of official views to that effect.

It is in the interests of all to prevent mergers that would lead to monopolistic conditions. So, at first glance, the aims of this bill may seem appealing. Every businessman accepts the present law prohibiting mergers which lessen competition. With that law on the books, there is no opposition to authorizing an appropriate government agency to stop such mergers before they take place. But the present pre-merger notice bill would place in the hands of government agencies the power effectively to hinder any merger of companies above a certain size even though there is no conceivable effect upon competition. A textile company, for example, with assets of $11,000,000 wishing to acquire a corporation with a plant worth only $50,000, or, for that matter only $5000, must first approach the government. A company engaged in the sale of shoes, women's wear, or automobiles on the main street of any town in the U. S. might not be able to sell out to an interstate company having assets of $10,000,000 without giving 90 days notice to the government.

Despite its name "Pre-*Merger* Notification," the bill applies to situations where no merger at all is involved, in the usual sense of that word. Any $10,000,000 corporation engaged in commerce would be subject to investigation by the government before it might acquire as little as 6 percent of the assets of any other company also engaged in commerce. This might mean, that one could not sell to an oil company one of several service stations which he—the sole owner—had incorporated for good business reasons. Any 100 percent subsidiary formed for commercial reasons by a corporation in the $10,000,000 category could not be absorbed by the parent nor taken over by another 100 percent subsidiary unless the proposal was reported in advance.

This bill if it becomes law would also bring about formidable administrative problems for the government. It would present not one, but two government agencies with a flood of reports to investigate and act upon. It would add to the work of government along with greater confusion for the business community. In an attempt to prevent a relatively small amount of undesirable business activity, H.R. 9424 introduces a new phi-


How to win friends and educate Congressmen . . .
Let your Congressman know what your problems are.
• Develop an awareness of the lawmaker's problems.
• Follow closely the activities of Congress.
• Compliment as well as criticize your Congressman.
• Spread an understanding among other public groups.

losophy. No longer is the citizen or corporation obliged solely to observe the law. Now Washington would have to be advised about ordinary business transactions which, under no stretch of the imagination, could violate the law. This bill obviously holds potential interference for a great many day-to-day business operations.

Medieval punishment. Also in the anti-trust field is a bill recently introduced into the Senate, labelled S 3516. In effect, this bill provides that company officials who authorize actions subsequently held to violate the penal provisions of the anti-trust laws shall be guilty of a misdemeanor, shall be subject to a $50,000 fine, and shall forfeit twice their pay during the period of violation. In addition, they shall be enjoined from rendering any service to the company employing them, for not less than 90 days and perhaps permanently, and from receiving any compensation during that time. Going a big step further, S 3516 says the violator shall be enjoined from working for any "competing company."

Here again the bill has a superficial appearance of merit. But what troubles one about it is the almost medieval quality of the punishment. A company official who violates the Sherman Act is now subject to fine and imprisonment. This bill would also bar him from earning his livelihood after he has satisfied the normal penalties of the law. This is more severe treatment than that given the worst felon. Just as the law of ancient England chopped off the hand of the pickpocket, this law would take the right arm of the businessman. And this is to be done to enforce a statute where not only lawyers but the judges of our highest court often disagree on what is right and what is wrong. Few statutes are less understood or subject to more different interpretations than the Sherman and Clayton Acts. What is right and accepted in one year can be, and has been, judged illegal in the next. The present bill if it were to become law might force the officer of any company to take a long vacation without pay because he has followed in good faith the advice, given in good faith, of the most competent counsel on the law's interpretation.

Heavy Income Tax. Far more sweeping in its implications for all business and the country's economic health is H.R. 9067, a bill which would realign corporate income tax rates so that they would be graduated from a low of 22 percent to a high of 75 percent. (That is correct, *three-quarters* of a company's income in the top bracket.)

This proposed law, which represents a radical departure from the historical pattern of business taxation followed by our government, is presented in the guise of helping smaller companies whose rates of taxation would be reduced. The tax laws, of course, are designed to provide our government with revenues as well as to stimulate a high level of capital investment, expansion of our economy, and to encourage consumption. They are not designed to achieve so-called "social objectives" no matter how laudable these objectives may seem to be.

There can be, of course, no quarrel with the aim of increasing the health and prosperity of small business firms. But H.R. 9067 would, from every possible viewpoint, produce exactly opposite effects. For it is predicated on the misconception that large business organizations are inimical to smaller ones, when the actual fact is that they both depend on the other for their well being. The present bill would remove from our economy billions of dollars now being invested for growth by larger corporations, dollars which are being paid to hundreds of thousands of smaller companies for goods and services.

An example is the $475,000,000 being spent in the U. S. in 1956 by

the domestic affiliates of Standard Oil Company (New Jersey). This money represents the re-invested profits belonging to more than 330,000 stockholders, put to work to build and modernize facilities capable of supplying the increasing energy needs of the American consumer. Much of this $475,000,000 is being spent for materials supplied to us by more than 26,000 separate companies in the U. S.—and 75 percent of these suppliers employ less than 500 people (the yardstick by which a "small" business is measured). The smaller companies are receiving about 50 percent of the dollar total of the purchases made by Jersey's domestic affiliates.

If confiscatory taxes cut the amounts available to invest, there would be immediate economic repercussions among all members of the country's industrial community. It would not be very practical help to cut the tax rates of smaller companies while, at the same time, their incomes were being eliminated or drastically reduced. This boils down to the possibility that instead of having small business maintained and supported by "big business," that small business may have to be supported by "big Government." Which course would small business prefer?

When one multiplies this example a thousandfold, the true effects of this proposed tax law become uncomfortably plain. The large business institutions, which have grown large because they have big services to perform in this growing country, would by this measure be stopped dead in their tracks. They would be forced to forego expansion plans which are important props to our present and future prosperity. The effects of this action would be felt very promptly not only by the larger corporations directly involved, and the smaller companies the proposed law is supposed to help, but also by every American. With such a tax law the government's tax revenue would soon decrease. Reduced business activity would squeeze the wage earner, the farmer's income would shrink, and there would soon be less and less goods for the consumer. As our economy leveled off, finding no space in which to move ahead, it might well begin to falter and fall back.

Must Combat Ignorance. Whether or not such bills ever become law, their existence demonstrates dangerous ignorance about business and the need for action to combat such ignorance.

Legislators from both parties have demonstrated a feeling that the interests of businessmen are in some way incompatible with the general welfare of the U. S. Businessmen themselves know how false that notion is. But obviously some legislators do not. Their distrust is mirrored in these specific proposals mentioned.

Ignorance is always dangerous and none more so than this ignorance about the actions, motives, and economic effects of business. Replacing it with the truth should be the concern of all businessmen.

"How is that to be done?" is the very natural rejoinder, and one to which there are many effective answers.

For example, businessmen have the specific responsibility for seeing that members of Congress know what makes business tick. The business organizations and industrial plants of a state or a congressional district are vital to the areas, and are entitled to proper representation by legislators. But these men and women must have knowledge and background to provide such representation. As individuals, ask your congressmen to visit your plants and offices. Show them what you make or do, and explain the economic and social importance of it to your community. If they are good lawmakers, they will ask questions and, in their own way, reach a better understanding of your aims and problems.

Understanding is a two-way street. So don't be afraid to listen to what your legislators have to say. Businessmen's clubs are ideal forums for lawmakers to utilize in revealing what's on their minds. And it isn't overly important, or even likely, that you will achieve immediate or complete agreement. But the very process of friendly and constant communication will lead to a respect for the other's point of view, which is the true beginning of wisdom.

Businessmen should work to develop understanding with legislators in the same ways they would do so with their customers or friends. Find out where your congressman is planning to speak in your neighborhood—and not alone before organizations to which you belong—and take the time to go and hear his story. Read his speeches given on the floor of the House or the Senate. Follow his voting record. When you feel he has acted wisely about a measure, no matter whether you have a direct interest in it, write him a note telling of your approval. A continual and sincere display of interest in his problems and activities is the most effective method of building in his mind an interest in your own business affairs.

This long-range approach to better understanding seems preferable to what is often the usual relationship of businessmen with Congress. Too many legislators see or hear from their business constituents only when they have a complaint about specific legislation, or are seeking a favor. Business is a chief ingredient in many of the principal interests of our lawmakers—the maintenance of employment, progress in research, the extension of technology, and the defense of our nation. This makes it only more logical for businessmen to know their legislators 365 days a year, in the "off season" periods as well as when Congress is in session. In those times there is no atmosphere of conflict, no hint of self-seeking, and less possibility of mistaking your aims as a businessman in trying to explain the fundamentals of business and how important they are to the health of our economy which supports all of our citizens.

In many other ways, too, businessmen have the responsibility for extending this understanding widely among other public groups. Plant visits can turn community indifference or suspicion into friendship. The sponsoring by business of Junior Achievement companies brings knowledge of our economic system to boys and girls at an age when, as they learn by doing, the lessons will really sink home. The cheerful assumption by companies—large or small—of civic duties in their own towns, states, or on a national scale will—far more than any words—convince the public that business organizations are interested in making profits by improving our society, not by extracting from it what the traffic will bear.

Real understanding of business is worth working for. The future of our industrial economy is at stake, along with the future of every American.

ACKNOWLEDGMENT

From an address by M. J. Rathbone, president Standard Oil Company (New Jersey), before the Newark Rotary Club, Newark, N. J., April 24, 1956.

First Quarter Earnings Up 20.4% for 45 Oil Companies

Gulf and The Texas Company report largest increases among international companies. Above-average gains also shown by Cities Service, Phillips, Shell, Sunray, and Anderson-Prichard.

FORTY-FIVE U. S. oil companies reported combined net income of $770,370,159 for the first quarter of 1956. That was an increase of 20.4 percent over the profits in the first three months of 1955.

Of the 45 companies, only 7 reported less profit this year than last year for the initial quarter.

Companies of all sizes and kinds showed favorable results.

As a group, five internationally operating companies, with large foreign interests, showed an increase of 22.0 percent in earnings. That was better than the gain for the industry as a whole.

Forty other companies, operating principally in the U. S. and in some cases in Canada, together reported an increase of 16.8 percent in first quarter earnings, compared with last year.

Two of the international companies, Standard Oil Company (New Jersey) and Standard Oil Company of California, reported earnings increases of 15.8 and 15.7 percent, respectively, or a little less than the gain for the domestic companies combined. Socony Mobil Oil Company's increase of 19.2 percent was better than the domestic company gain but less than the industry-wide increase. Gulf Oil Corporation's 53.0 percent gain in first quarter earnings was the sharpest for any major company. That of The Texas Company, amounting to 24.9 percent, also was outstanding.

Standard of New Jersey's results were better in foreign areas than in the U. S. Compared with its over-all 15.8 percent increase in earnings for the first quarter, its large domestic subsidiary, Humble Oil & Refining Company had a gain of 7.8 percent.

Some of the companies operating mainly in the U. S. showed comparatively large increases in earnings for this year's first quarter. In some cases, the large gains were not significant, as results in last year's initial quarter were relatively low for the concerns involved.

Anderson-Prichard Oil Corporation's first quarter profits were more than double those in the like period last year. Gains of over 20 percent, or better than the industry average, were reported by Atlantic Refining Company, Bishop Oil Company, Cities Service Oil Company, Colorado Oil & Gas Company, Delhi Taylor Oil Corporation, Getty Oil Company, Panhandle Oil Corporation, Phillips Petroleum Company, Shell Oil Company, Sunray Mid-Continent Oil Company, Union Oil & Gas Corporation of Louisiana, and Wilcox Oil Company. **—The End.**

Net Earnings of U. S. Oil Companies in First Quarter, 1955 and 1956

COMPANY	TOTAL AMOUNT			PER SHARE		
	1955	1956	% Dif.	1955	1956	% Dif.
Companies with Large Foreign Operations:						
Gulf Oil Corp.	$ 45,320,000	$ 69,319,000	+ 53.0	1.61	2.47	+ 53.4
Socony Mobil Oil Co.	52,000,000	62,000,000	+ 19.2	1.48	1.77	+ 19.6
Standard Oil Co. of Calif.	53,130,557	61,493,965	+ 15.7	1.68	1.95	+ 16.1
Standard Oil Co. (N.J.)	177,000,000	205,000,000	+ 15.8	.90	1.04	+ 15.6
The Texas Company	56,021,212	69,958,343	+ 24.9	2.04	2.55	+ 25.0
Total 5 Companies	383,471,769	467,771,308	+ 22.0	....	....	.....
Other Companies:						
Amerada Petroleum Corp.	6,399,698	7,622,948	+ 19.1	1.01	1.21	+ 19.8
Anderson-Pritchard Oil Corp.	611,203	1,352,824	+121.3	.38	.83	+118.4
Arkansas Fuel Oil Co.	2,157,741	1,906,676	— 11.6	.57	.50	— 12.3
Argo Oil Corp.	1,239,191	1,231,553	— 0.6	.62	.62	.....
Ashland Oil & Refining Co.	3,024,585	3,650,925	+ 20.7	.48	.59	+ 22.9
Atlantic Refining Co.	9,821,000	12,223,000	+ 24.5	1.06	1.32	+ 24.5
Bishop Oil Co.	68,762	118,752	+ 72.7	.13	.22	+ 69.2
Cities Service Co.	14,074,633	18,179,769	+ 29.2	1.42	1.80	+ 26.8
Colorado Oil & Gas Co.	405,285	533,045	+ 31.5	.09	.13	+ 44.4
Continental Oil Co.	12,142,000	13,794,000	+ 13.6	1.25	1.41	+ 12.8
Delhi Taylor Oil Corp.	628,600	1,100,000	+ 75.0	.12	.21	+ 75.0
Getty Oil Co.	1,233,744	2,333,210	+ 89.1	.20	.40	+100.0
Houston Oil Co. of Texas	2,071,679	2,166,160	+ 4.6	1.54	1.59	+ 3.2
Honolulu Oil Co.	3,201,818	3,749,136	+ 17.1	.85	1.00	+ 17.6
*Humble Oil & Refg. Co.	45,750,000	49,300,000	+ 7.8	1.27	1.37	+ 7.9
Midwest Oil Corp.	1,596,455	1,788,373	+ 12.0	.62	.70	+ 12.9
Mississippi River Fuel Corp.	1,652,263	1,829,340	+ 10.7	.49	.54	+ 10.2
National Gas & Oil Corp.	156,567	190,092	+ 21.4	.35	.42	+ 20.0
Ohio Oil Co.	10,378,814	11,771,336	+ 13.4	.79	.90	+ 13.9
Panhandle Oil Corp.	210,718	287,148	+ 36.3	.13	.18	+ 38.5
Phillips Petroleum Co.	22,110,258	28,332,238	+ 28.1	1.50	1.65	+ 10.0
Plymouth Oil Co.	2,204,044	2,283,031	+ 3.6	.91	.94	+ 3.3
Pure Oil Co.	9,429,000	9,184,000	— 2.6	1.05	1.07	+ 1.9
Quaker State Oil Refg. Corp.	602,173	525,681	— 12.7	.73	.64	— 12.3
Richfield Oil Corp.	7,141,121	7,511,559	+ 5.2	1.79	1.88	+ 5.0
Seaboard Oil Co.	1,689,256	2,012,235	+ 19.1	.46	.55	+ 19.6
Shell Oil Co.	28,584,792	35,010,360	+ 22.5	1.04	1.27	+ 22.1
Signal Oil & Gas Co.	2,642,769	2,443,207	— 7.6	.71	.62	— 12.7
Sinclair Oil Corp.	21,207,935	24,245,569	+ 14.3	1.68	1.68	.....
Skelly Oil Co.	7,698,141	8,033,061	+ 4.4	1.33	1.40	+ 5.3
Southern Production Co.	1,229,563	1,276,707	+ 3.8	.71	.73	+ 2.8
Standard Oil Co. (Ind.)	34,950,826	41,377,863	+ 18.4	1.08	1.23	+ 13.9
Standard Oil Co. (Ohio)	6,079,843	6,517,232	+ 7.2	1.46	1.57	+ 7.5
Sun Oil Company	11,722,108	12,255,231	+ 4.5	1.21	1.21	.....
Sunray Mid-Continent Oil Co.	8,500,000	11,300,000	+ 32.9	.51	.63	+ 23.5
Texas Gulf Producing Co.	1,854,924	1,797,493	— 3.1	.51	.49	— 3.9
Texas Pacific Coal & Oil Co.	2,023,492	2,054,916	+ 1.6	.56	.57	+ 1.8
Tide Water Associated Oil Co.	8,083,000	9,037,000	+ 11.8	.67	.72	+ 7.5
Union Oil Co. of Calif.	7,106,567	7,030,225	— 1.1	.94	.96	+ 2.1
Union Oil & Gas Corp. of La.	353,931	1,238,236	+249.9	.20	.68	+240.0
Wilcox Oil Co.	223,471	299,719	+ 34.1	.79	1.06	+ 34.2
*Total 40 Companies	256,511,970	299,593,850	+ 16.8	....	....	.....
*Total 45 Companies	639,983,739	770,370,159	+ 20.4	....	....	.....

* Humble is excluded from totals, being included as a subsidiary of Standard Oil Company (New Jersey).

How the Cost of Finding and Producing Oil Has Increased

Current price of crude at well does not cover producer's cost of exploration, development and production.

Survey shows cost averaged $1.47 per barrel in 1944, rose to $2.21 in 1948, and jumped to $3.16 in 1953.

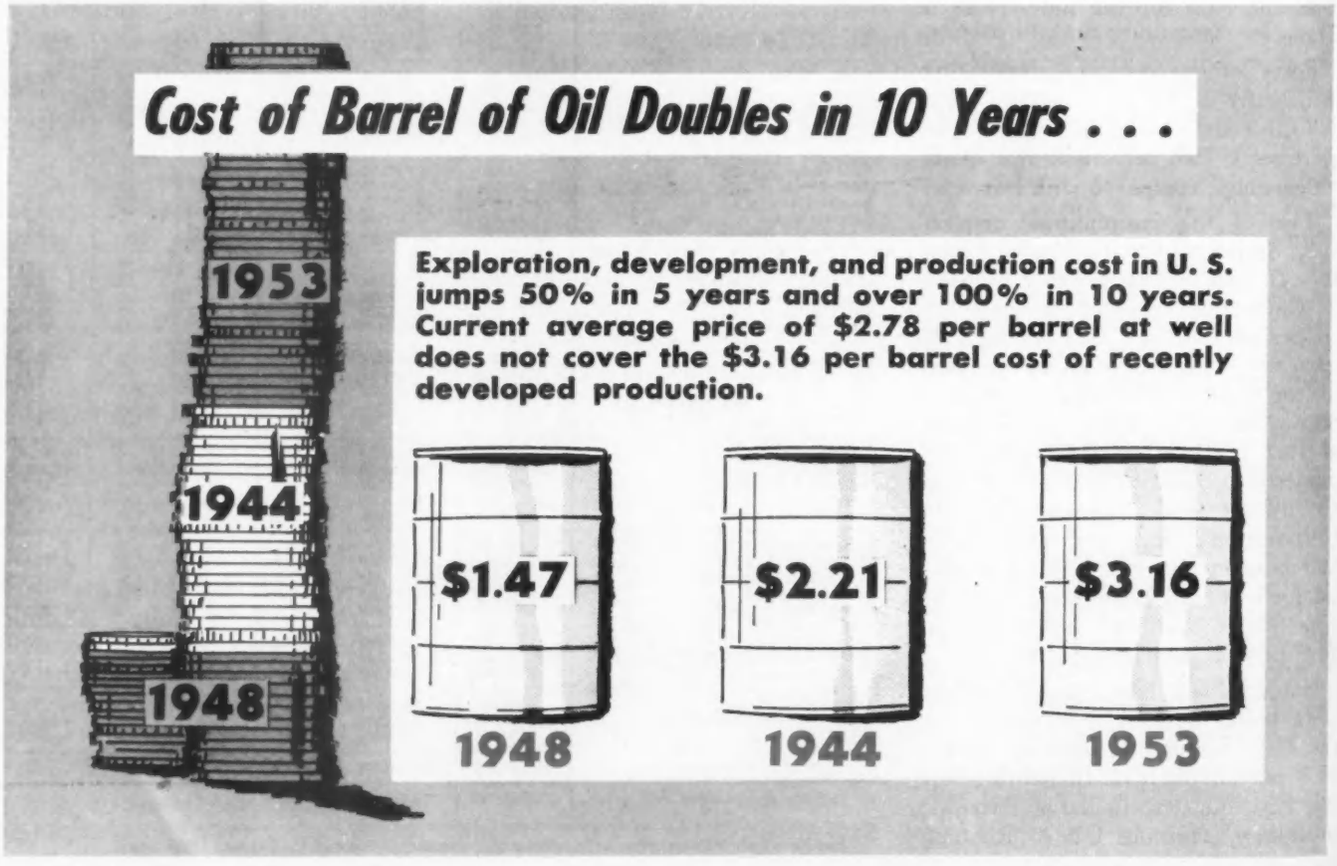
AS LONG AGO as 1953 the producer's cost of crude oil in the U. S. stood at $3.16 per barrel. The cost had more than doubled in less than ten years.

This figure included exploration, development and production costs. The cost had averaged $1.47 per barrel in 1944, rose 50 percent to $2.21 a barrel in 1948, and jumped in 1953 to $3.16 a barrel, or more than twice the 1944 cost. (The latest cost of $3.16 a barrel exceeds the average price of about $2.78 per barrel received at the well.)

Total cash expenditures covering exploration, development, and production increased from $2.1 billion in 1944 to $3.8 billion in 1948 and to $6.4 billion in 1953.

These cost figures were revealed in the recently published joint survey of the American Petroleum Institute, the Independent Petroleum Association

Continued on Page 96


Cost of Barrel of Oil Doubles in 10 Years . . .
1953
1944
1948
Exploration, development, and production cost in U. S. jumps 50% in 5 years and over 100% in 10 years. Current average price of $2.78 per barrel at well does not cover the $3.16 per barrel cost of recently developed production.
$1.47
$2.21
$3.16
1948
1944
1953

Who Is Listening to Non-Union Employes?

Grievance outlets should be made available to non-union as well as union employes. A plan can come from management . . . or it may eventually become a law.

By WILLIAM S. WILCOX
Newtown Square, Penn.

THE NLRB some months ago ruled that a welfare plan is illegal if it provides benefits for union members only.

The Board ruled that both the employer and the union in the case had violated the unfair labor practice section of the law—that the employer had illegally discriminated against individual employes, and that the union had violated the law by being a party to the same agreement.

A recent court decision denied redress to a non-union employe for an alleged wrong on the premise that the union-contracted grievance procedure should have been followed by the non-union employe. In effect the court's interpretation was that the grievance procedure applied to all employes, union and non-union alike.

Findings such as these may lead eventually to a legal pronouncement of the right of all non-management employes in a partly organized company to the use of the same grievance procedure.

At present non-union members are usually advised informally of an "open door" approach.

Not long ago, the personnel director of a prominent company surmised that the primary reason why the "white collar" groups were not being organized more rapidly was because of the ineptness of the union organizing methods—rather than a lack of desire to be represented. True or false as this surmise may be, the indication is that the general "open door" policy available to non-union employes remains an optimistic management sedative.

Employes at all levels of an organization are chary of intruding on the time of a higher executive with their personal problems and irritations. If the "open door" practice were a reality, higher executives in even moderate sized organizations would find themselves involved in one man counselling services—so prevalent is the desire on the part of employes for personal assurance and a release from job tensions. It can be demonstrated that even in a normally well-run industrial relations department, the practice of listening to non-union employes is an art in sad neglect. The usual brush-off is, "Have you talked this over with your supervisor?" In unionized companies, the union stewards step into the breach for the union members. As for the non-union employes—is anybody listening to them?

At this point someone is sure to raise a question: "What about the

How "Open" is the Open Door?

Employes at all levels of an organization shy away from intruding on the time of a higher executive with their personal problems and irritations.

If the "open door" were a reality, higher executives in even moderate sized operations would find themselves involved in one-man counselling services—so prevalent is the desire on the part of employes for personal assurance and a release from job tensions.

Even in a normally well-run industrial relations department, the practice of listening to non-union employes is an art in sad neglect. The usual brush-off is, "Have you talked this over with your supervisor?"

In unionized companies, the union stewards step into the breach for the union members. As for the non-union employes—Is anyone listening to them?

supervisor—isn't it up to an employe to go to him?" The soundness of the theory cannot be denied. The catch is that a general apprehension of authority inhibits the practice by non-union employes. Particularly when the subject of the employes' concern might affect his supervisor.

The union member by contractual right is entitled to the safety valve of a formal grievance procedure. It is a privilege of equal concern to all employes. Withholding it from a non-union employe may in time be looked upon in the same light as the denial of welfare benefits in the case ruled upon by the Labor Board. The privilege to speak out without fear, to air a matter of personal concern is as fundamental to the self-respect and personal security of the non-union employe as to the union member who exercises the contractual right freely.

Aside from the discriminatory feature, there is the important human organization to consider. In the human organization, non-union employes exist as thinking, feeling beings who have an acute sense of fairness, of personal justice and a sensitive regard for how they appear to others. Individually and collectively, they have a common bond of daily contact with the unionized employes of an organization. They voice their private views to one another and the "grapevine" enlists sympathizers all along the line.

When they screw up their courage to bridge the gap between themselves and their supervisor they take brooding exception to any pat answer which smacks of "charity dispensed by a statistical christ, chaste as snow and bleekly iced." Finally, then only in a climatic act of desperation a non-union employe may pierce the barrier to higher management. But today the non-union story is told, if at all, in a termination interview. Company policies and supervisory practices then stand naked as good or bad—too late for salvaging the employe and his experience.

The solution is a simple one: The right of the established contractual grievance procedure could be made known and be available to all employes, non-union and union alike. The break through can come from management or it may eventually be established by law. —**The End.**

Producer's Costs . . .

Continued from Page 90

of America, and the Mid-Continent Oil & Gas Association.

The survey supplemented a report published last January. (See WORLD OIL, February 15, 1956, pages 138-139.) First part of the survey covered drilling costs. It showed that operators expended an average of $50,000 in drilling and equipping each of the 49,279 wells drilled in 1953. It emphasized that drilling costs increased geometrically in drilling deep wells.

Expenditures for exploration and development in 1953 were slightly more than double the 1944 totals. They were equivalent to 45 cents a barrel in 1944; 64 cents in 1948; and 95 cents in 1953. Development expenditures were 59 cents a barrel in 1944; 87 cents in 1948; and $1.19 in 1953. Production or lifting costs were almost 2½ times as great in 1953 as in 1944. They averaged 43 cents per net barrel produced in 1944; 70 cents in 1948; and $1.02 in 1953.

Lumped together, as production statistics normally are, the figures indicate that for each barrel of net crude oil production in 1944, the estimated expenditures were $1.47 a barrel; in 1948 they were $2.21 a barrel; and in 1953 they were $3.16 a barrel. Expenditures per net barrel produced increased 50.3 percent between 1944 and 1948; 43 percent between 1948 and 1953; and 115 percent between 1944 and 1953.

The reported expenditures covered total operations of the petroleum producing branch only, but included gas. They represented cash outlays rather than expenses as recorded by accounting practices. They did not include cash outlays for such items as income taxes, payments of interest and principal on debts, or returns to investors. The expenditures covered are only those cash outlays involved in carrying on petroleum operations for exploration, development and production.

Operators' income from U. S. petroleum production in 1944 was estimated at $2,011,000,000 in 1944; $5,044,000,000 in 1948; and $6,471,000,000 in 1953. This is equivalent to $1.39 per barrel of net crude oil production in 1944; $2.90 per barrel in 1948; and $3.17 per barrel in 1953. These figures on income cannot be compared with expenditures as indicated to arrive at a "profit or loss" basis, for reasons previously stated.

Replies from operators accounted for nearly two-thirds of U. S. crude oil production. From their reports industry totals were computed. The reporting companies ranged in size from the smallest, with only a few thousand barrels production per year and average output of only one barrel per well per day, to the largest, with production of over 100 million barrels annually and an average output of 30 barrels per well per day.

—**The End**

TABLE 1

Estimated Industry Expenditures

Million Dollars

ITEM	1944	1948	1953
Exploration	**645**	**1,111**	**1,956**
Dry Holes	274	462	797
Other*	327	570	987
Overhead	44	79	172
Development	**851**	**1,518**	**2,419**
Producing Wells	593	1,058	1,762
Equipment	203	362	483
Overhead	55	98	174
Production	**627**	**1,212**	**2,073**
Lifting Cost	566	1,097	1,846
Overhead	61	115	227
Total Expenditures	**2,123**	**3,841**	**6,448**

*Lease purchases, lease rentals, geological and geophysical work, etc.

TABLE 2

Estimated Industry Expenditures Per Barrel of Net Crude Oil Production

Dollars Per Barrel

ITEM	1944	1948	1953
Exploration	0.45	0.64	0.95
Development	0.59	0.87	1.19
Production	0.43	0.70	1.02
Total	1.47	2.21	3.16

TABLE 3—Operators' Income From U. S. Petroleum Production

SOURCE	Million Dollars			Dollars per Barrel of Net Crude Oil Production		
	1944	1948	1953	1944	1948	1953
Crude Oil	1,746	4,517	5,464	1.21	2.60	2.68
Natural Gas	163	288	668	0.11	0.16	0.33
Royalty owned by operators	93	226	319	0.06	0.13	0.15
Other lease revenue	9	13	20	0.01	0.01	0.01
Total	2,011	5,044	6,471	1.39	2.90	3.17

Packaged Compressor

CFA now on tour
—in Oklahoma, Kansas, Colorado, Texas and Louisiana.
Watch your newspaper for date and location of demonstration.

Designed by Clark for gas lifting or gathering

You asked for this field compressor—as rugged, compact and perfectly balanced as the famed "Midget Angle" but of half the horsepower.

Now you have it, in the new Clark Model CFA. Rated at 75-200 bhp, this packaged compressor station is ideal for gas lifting or gas gathering of from one to a dozen wells. This is particularly true when well spacing is wide and multiple sands are being worked.

The CFA uses a new specially designed 5" stroke balanced/opposed compressor directly connected to a standard design gas engine. The compressor and engine, together with a heavy duty radiator, scrubber, etc., are mounted on a rugged steel skid.

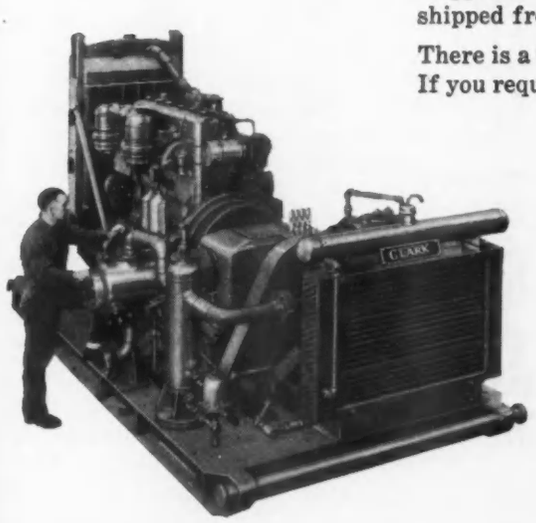
The CFA is virtually vibrationless in operation because of its balanced/opposed action. In most cases the small amount of concrete used to level the unit will provide ample support.

Operating at engine speed eliminates the need for cumbersome belt and gear drives. The resulting compactness permits mounting the complete unit on a skid measuring only 7' 3" x 15'.

Easily and speedily transported on an average size truck, this new field compressor can also be operated on truck or floating barge. The compact design minimizes costs if a shelter is required.

You have no field assembly problems. The CFA is factory assembled, tested and shipped as a complete unit. Because of standardization the CFA can be shipped from stock in most instances.

There is a Clark CFA specialist in your area to give you all the facts.
If you require greater horsepower, ask him about the Clark HMA and HMAB.



CLARK BROS. CO., OLEAN, N. Y.
ONE OF THE DRESSER INDUSTRIES
Offices in Principal Cities Throughout the World

CLARK®

ONE OF THE DRESSER INDUSTRIES

Packaged Compressors

Independents Big Factor; Majors Jockey for Rank

• Small operators drill 78% of wells, produce 38% of crude, and refine 11% of oil in U. S.

• Standard (N. J.) remains No. 1 company in production and refining. The Texas Company drills the most wells.

By L. J. LOGAN
World Oil Staff

Small companies and independent operators with crude oil production and/or refinery runs averaging less than 10,000 barrels daily accounted for about 38 percent of the crude output of the U. S. in 1955. That compared with 40 percent in 1954. They drilled about 78 percent of the wells that were completed, as against 80 percent in 1954. The small operators accounted for about 11 percent of total U. S. refinery runs in 1955, compared with 13 percent in 1954.

These figures for 1955 are indicated by the tables herewith. The tabulations were compiled from the annual reports of the oil companies covering 1955.

Comparable data for a year ago, two, three, and four years ago were published in World Oil for June, 1955, Page 78; June, 1954, Page 66; May, 1953, Page 86; and May, 1952, Page 50.

As indicated above, the independents accounted for somewhat smaller proportions of industry operations in 1955 than in 1954. There were small decreases in their share of crude production, wells drilled, and refinery runs. However, they had shown increases in 1954 over 1953. The latest data are not greatly different from the proportions of U. S. operations accounted for by independents in 1953 and several prior years.

Strong competition in the U. S. petroleum industry is reflected in the ranking of companies in the industry, as shown in the tables herewith. In 1955, as in prior years, there were numerous changes in rank. Some companies achieved higher ranking than in the previous year in crude production, number of wells drilled, or refinery runs, or in more than one of these categories. Conversely, other companies failed to hold their former rankings and took lower positions.

Standard Oil Company (New Jersey), world's largest oil company,

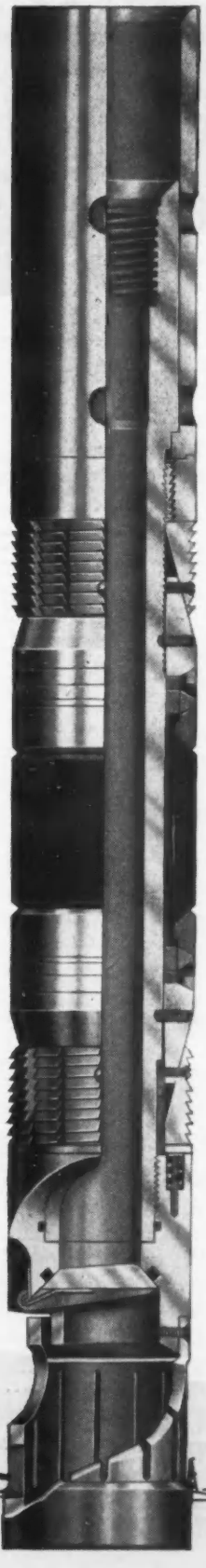
Domestic Refinery Runs and Crude Oil Production of U. S. Companies in 1955
(Data from all available annual reports of U. S. companies with refinery runs and/or crude production above 10,000 barrels daily.)

COMPANY and RANK IN REFINING	CRUDE RUNS TO STILLS			CRUDE OIL PRODUCTION	
	Total Barrels	Barrels Daily	Percent of U.S.	Barrels Daily	Percent of Runs to Stills
(1-A) Standard (N.J.) U.S. Affiliates, Total	286,160,000	784,000	10.48	414,300	52.8
1. Standard (N.J.) Net Share of U.S. Affiliates	274,439,850	751,890	10.05	367,851	48.9
Esso Standard Oil Co.	188,705,000	517,000	6.91	.....	....
87% of Humble O. & R. Co.	78,434,850	214,890	2.87	310,851	144.7
Carter Oil Co.	7,300,000	20,000	0.27	57,000	285.0
2. Standard Oil Co. (Indiana)	219,540,930	601,482	8.04	*274,083	45.6
3. Gulf Oil Corporation	214,572,000	587,867	7.86	230,731	39.2
4. The Texas Company	209,512,449	574,001	7.67	394,302	68.7
5. Socony Mobil Oil Company	199,126,845	545,553	7.29	260,327	47.7
6. Shell Oil Company	168,896,000	462,724	6.19	278,000	60.1
7. Standard Oil Co. of California	†168,698,278	†462,187	6.18	*269,261	58.3
8. Sinclair Oil Corp.	157,173,601	417,000	5.57	135,820	32.6
9. Cities Service Co.	96,225,000	263,628	3.53	126,296	47.9
(9-A) Humble Oil & Refining Co.	90,155,000	247,000	3.30	357,300	144.7
10. Sun Oil Company	87,136,964	238,729	3.19	115,376	48.3
11. Phillips Petroleum Company	83,458,345	228,653	3.06	*125,200	54.8
12. Atlantic Refining Co.	71,618,000	196,215	2.62	*101,518	51.7
13. Tide Water Associated Oil Co.	61,010,845	167,153	2.23	89,626	53.6
14. Pure Oil Company	60,492,335	165,731	2.22	66,859	40.3
15. Union Oil Co. of California	57,471,000	157,453	2.11	103,837	65.9
16. Continental Oil Company	53,170,645	145,672	1.94	*134,440	92.3
17. Standard Oil Co. (Ohio)	47,234,939	129,411	1.73	*31,406	24.3
18. Richfield Oil Corporation	44,508,000	121,940	1.63	56,791	46.6
19. Sunray Mid-Continent Oil Co.	36,281,030	99,399	1.33	*80,121	80.6
20. British American Oil Co.	35,676,000	97,742	1.31	28,753	29.4
21. Skelly Oil Company	17,044,574	46,587	0.62	68,014	146.0
22. The Ohio Oil Company	15,483,780	42,421	0.57	98,404	232.0
23. Plymouth Oil Company	11,345,000	31,082	0.42	17,647	56.8
24. Delhi-Taylor Oil Corporation	10,300,000	28,219	0.38	3,825	13.6
25. Clark Oil and Refining Corp.	8,335,468	22,837	0.30	.....	....
26. Colorado Oil and Gas Corp.	4,804,913	13,164	0.18	4,145	31.5
27. South Penn Oil Company	3,208,715	8,791	0.11	10,254	116.6
‡Total, 27 Companies	2,428,485,656	6,639,641	88.76	3,519,336	53.0
Remainder of Industry	301,732,344	840,359	11.24	3,287,664	391.2
Total, United States	2,730,218,000	7,480,000	100.00	6,807,000	91.0

* Includes natural gas liquids. † Total Western Hemisphere. ‡ Includes Item (1-A) for Standard (N.J.); excludes other data on that company and its subsidiaries, Esso Standard, Humble, and Carter.

For Permanent-Type Well Completions

THE BAKER



RETAINER PRODUCTION PACKER

PRODUCT NO. 415D

BAKER PACKERS ADD PERMANENCE TO PERMANENT-TYPE WELL COMPLETIONS

When you select a Packer for a Permanent-Type Well Completion, remember this fact: of all the tools used in permanent-type well completions, only the *Packer* is required to be *permanent*. Guns, Extensions, Plugs, Gas-Lift and Circulating Valves can be removed or replaced on wire line . . . but the Packer, like the casing, is required to perform for the life of the selected producing intervals. Baker Packer Completions are Permanent Completions from the standpoint of packer performance.

Advantages of Baker Retainer Production Packer in Permanent-Type Well Completions:

PERMANENT, RELIABLE PACK-OFF will hold against any pressure differential from above or below that is safe for the casing.

FREE TUBING STRING . . . neither set-down tubing weight nor tubing tension required to achieve and maintain pack-off. Tubing can be anchored to Packer if desired.

CAN BE USED AS A SQUEEZE OR A PRODUCTION TOOL.

MEETS PERMANENT-TYPE WELL COMPLETION DIMENSIONAL REQUIREMENTS.

CAN BE SET ON WIRE LINE. PERMITS EASY REMOVAL OF TUBING STRING.

READILY DRILLABLE IN CASE OF EMERGENCY OR NEED.

BAKER OIL TOOLS, INC. HOUSTON • LOS ANGELES • NEW YORK

remained No. 1 in the U. S. in crude oil production and refinery runs, as in other recent years. However, it dropped into fourth place in 1955 in the number of domestic wells drilled, from second place in 1954. Jersey's U. S. affiliates ran to stills 784,000 barrels of crude per day, or 10.5 percent of the U. S. total. They had net crude production of 414,300 barrels daily, or 6.1 percent of the country's output. They drilled 889 wells in 1955.

The Texas Company again in 1955 drilled the greatest number of wells in the U. S. for any company. It has been No. 1 in each of the past several years. The company drilled 1620 U. S. wells in 1955. It remained No. 2 in production; but it dropped to No. 4 in refining from No. 3 in 1954.

Standard Oil Company (Indiana) remained No. 2 in refining and No. 4 in crude production, and was No. 10 in drilling. Gulf Oil Corporation jumped to No. 2 in drilling in the U. S. in 1955 from No. 4 in 1954. Gulf also rose to No. 3 in refining from No. 4 in 1954 and No. 5 in 1953. In domestic crude production Gulf remained No. 7, as in several earlier years.

Shell Oil Company continued No. 3 in crude production, rose to No. 3 in well completions, and remained No. 6 in refining. Socony Mobil Oil Company remained No. 5 in refining, rose to No. 5 from No. 6 in drilling, and remained No. 6 in production. Standard Oil Company of California was again No. 5 in production and No. 7 in refining, as in 1954.

The Ohio Oil Company was No. 7 in drilling, though No. 15 in production and No. 22 in refining. Sinclair Oil Corporation was No. 8 in drilling, production, and refining. Continental Oil Company was No. 9 in drilling and production and No. 16 in refining. Cities Service Oil Company was No. 9 in refining, No. 10 in production, and No. 11 in drilling.

Sun Oil Company was No. 10 in refining, and No. 12 in both production and drilling. Phillips Petroleum Company was No. 11 in both refining and production and No. 14 in drilling. Atlantic Refining Company was No. 12 in refining, No. 14 in production, and No. 20 in drilling.

Net Domestic Crude Oil Production of U. S. Companies in 1955

(Company's net share; does not include royalty and co-owner interests.)
Data from all available annual reports of U. S. Companies with crude production and/or refinery runs above 10,000 barrels daily.

COMPANY and RANK IN PRODUCTION	Total Barrels	Barrels Daily	Percent of U.S.
(1-A) Standard (N.J.) U.S. Affiliates, Total	151,219,500	414,300	6.09
1. Standard (N.J.) Net Share of U.S. Affiliates	134,265,615	367,851	5.41
(a) 87% of Humble	113,460,615	310,851	4.57
(b) 100% of Carter Oil Co.	20,805,000	57,000	0.84
(1-B) Humble O. & R. Co.	130,414,500	357,300	5.25
2. The Texas Company	143,920,230	394,302	5.79
3. Shell Oil Company	101,581,000	278,000	4.08
4. Standard Oil Company (Ind.)	*100,040,295	274,083	4.03
5. Standard Oil Co. of Calif.	*98,280,265	269,261	3.96
6. Socony Mobil Oil Company	95,019,355	260,327	3.82
7. Gulf Oil Corporation	84,216,815	230,731	3.39
8. Sinclair Oil Corporation	49,574,665	135,820	2.00
9. Continental Oil Company	49,071,000	134,440	1.98
10. Cities Service Company	*46,098,000	126,296	1.86
11. Phillips Petroleum Company	45,698,000	125,200	1.84
12. Sun Oil Company	*42,112,516	115,376	1.69
13. Union Oil Co. of Calif.	37,901,000	103,837	1.53
14. Atlantic Refining Company	*37,054,000	101,518	1.49
15. The Ohio Oil Company	35,917,629	98,404	1.44
16. Tide Water Associated Oil Co.	32,713,490	89,626	1.32
17. Amerada Petroleum Corp.	31,227,157	85,554	1.26
18. Sunray Mid-Continent Oil Co.	*29,244,427	80,121	1.18
19. Skelly Oil Company	24,824,958	68,014	1.00
20. Pure Oil Company	24,403,765	66,859	0.98
21. Richfield Oil Corp.	20,729,000	56,791	0.83
22. Standard Oil Co. (Ohio)	*11,463,734	31,406	0.46
23. British American Oil Co.	10,495,000	28,753	0.42
24. United Gas Corporation	8,100,995	22,194	0.33
25. Texas Pacific Coal & Oil Co.	7,502,765	20,556	0.30
26. Plymouth Oil Company	6,441,000	17,647	0.26
27. Arkansas Fuel Oil Company	5,110,000	14,000	0.21
28. Texas Gulf Producing Co.	4,777,750	13,089	0.19
29. Argo Oil Corporation	4,276,483	11,716	0.17
30. General Crude Oil Co.	4,017,555	11,007	0.16
31. South Penn Oil Company	3,742,710	10,254	0.15
32. Colorado Oil and Gas Corp.	1,512,874	4,145	0.06
33. Delhi-Taylor Oil Corp.	1,396,000	3,825	0.05
†Total 33 Companies	1,349,683,933	3,697,730	54.32
Royalty and Co-Owner Oil Produced, Est.	192,811,990	528,252	7.76
Gross Production, Above Companies	1,542,495,923	4,225,982	62.08
Remainder of Industry	942,025,077	2,581,018	37.92
Total, United States	2,484,521,000	6,807,000	100.00

* Includes natural gas liquids. † Includes Item (1-A) for Standard (N.J.),—excludes other data on that company and its subsidiaries, Humble and Carter.

Number of Wells Completed in U. S. in 1955 by U. S. Companies

Data from all available annual reports of U. S. Companies with crude production and/or refinery runs above 10,000 barrels daily.

COMPANY and RANK IN DRILLING	[1]Gross Wells	[2]Net Wells
1. The Texas Company	1,620	1,292
2. Gulf Oil Corporation	1,172	.....
3. Shell Oil Company	899	.....
(3-A) Standard (N.J.), U.S. Affiliates, Total	889	.....
(3-B) Humble Oil & Refining Company	841	.....
4. Standard (N.J.), Net Share of U.S. Affiliates	780	.....
87% of Humble Oil & Refining Company	732	.....
100% of Carter Oil Company	48	.....
5. Socony Mobil Oil Company	822	.....
6. Standard Oil Company of California	[3]822	.....
7. The Ohio Oil Company	755	714
8. Sinclair Oil Corporation	....	617
9. Continental Oil Company	718	557
10. Standard Oil Company (Indiana)	....	555
11. Cities Service Company	600	532
12. Sun Oil Company	611	510
13. Skelly Oil Company	622	461
14. Phillips Petroleum Company	692	453
15. Sunray Mid-Continent Oil Company	538	381
16. Union Oil Company of California	405	.....
17. Amerada Petroleum Corporation	398	293
18. The British American Oil Company	289	.....
19. Pure Oil Company	....	271
20. The Atlantic Refining Company	270	257
21. Tide Water Associated Oil Company	441	226
22. Standard Oil Company (Ohio)	252	164
23. United Gas Corp. (Union Producing Co.)	150	.....
24. Colorado Oil and Gas Corporation	152	130
25. Texas Pacific Coal and Oil Company	143	105
26. Arkansas Fuel Oil Corp.	75	.....
27. General Crude Oil Company	93	67
28. Plymouth Oil Company	90	.....
29. Argo Oil Corporation	81	59
30. Delhi-Taylor Oil Corporation	80	48
31. Richfield Oil Corporation	....	[4]46
32. Texas Gulf Producing Company	57	37
33. South Penn Oil Company	4	.....
[5]Total 33 Companies	....	[6]12,123
(Percent of U.S.)	....	21.7
Rest of Industry	....	43,696
(Percent of U.S.)	....	78.3
Total, United States	....	55,819

[1] Wells drilled by company, including wells owned jointly with others. [2] Company's net share in wells it drilled. [3] Total Western Hemisphere. [4] Data include only productive wells. [5] Includes Item (3-A) for Standard (N.J.) excludes other data on that company and its subsidiaries, Humble and Carter. [6] For companies that reported only gross wells, net wells are here estimated as 77.4% of gross; this ratio being indicated by reports showing both gross and net wells.

By **RAY L. DUDLEY,** Publisher, and **WARREN L. BAKER,** Editor

Too Much Gasoline Hurts Chances for Higher Crude Prices

Despite record seasonal consumption, high recent output holds drafts on gasoline stocks below desired volumes.

HIGHER U. S. CRUDE OIL PRICES do not appear quite as likely now as they did a month ago. This is because the economic position of the U. S. petroleum industry deteriorated somewhat during the past month. Again, it was the same old problem that has troubled the industry so often in recent years—too much gasoline.

Refiners manufactured too much gasoline during recent weeks, despite record consumption for this season of the year. This was a result of increased refinery runs combined with enlarged yields of gasoline during the first half of May. So much gasoline was made during the first two weeks of May, stocks of this product did not decrease as much as they should.

Otherwise, the industry's stocks of crude oil and other refined products were in good balance with needs, and operating levels indicated they would likely tend to improve in coming weeks.

•

THE DEMAND FOR HIGHER CRUDE PRICES by independent producers remains as intensive as in preceding months. The need, based on higher operating costs, was just as great.

However, prospects that higher crude prices would be forthcoming now depend more than before on the balancing of gasoline supplies with demand for this product. Trends in recent weeks did not make this outlook promising for producers.

If coming weeks see refiners continue to manufacture too much gasoline, prospects for higher crude prices will become dimmer. Refiners cannot be expected to pay higher prices for their basic raw material if the market for their principal product weakens, as it will if they continue to maintain recent high output of motor fuel.

GASOLINE STOCKS DECLINED by less than a normal amount during the first two weeks of May. This situation must be corrected in coming weeks. Otherwise, excessive motor fuel inventories will cause refiners considerable marketing problems and crude producers' chances of higher crude oil prices will be a serious setback.

Due to higher gasoline production, only 1.8 million barrels were drawn from storage between the end of April and May 11. During the corresponding period of 1955, motor fuel inventories declined 4⅔ million barrels. Consequently, U. S. gasoline stocks on May 11 were 16¾ million barrels larger than on the same date a year before. At the beginning of May they had been but 13½ million barrels greater than in 1955.

It was significant that the important marketing territory outside of California showed the same trend. Gasoline stocks east of California became 13⅓ million barrels greater than a year ago, although they had been only 9½ million barrels larger at the end of April.

•

IT BECOMES INCREASINGLY IMPORTANT in view of trends in recent weeks that refining levels in weeks ahead be adjusted to permit heavier drafts on gasoline stocks.

Early May upward refining trends should not be continued. U. S. refinery runs ranged from 7,436,000 barrels to 7,551,000 barrels daily in April. They were stepped up to 7,664,000 barrels during the week ended May, and then to 7,911,000 barrels per day during the week ended May 11.

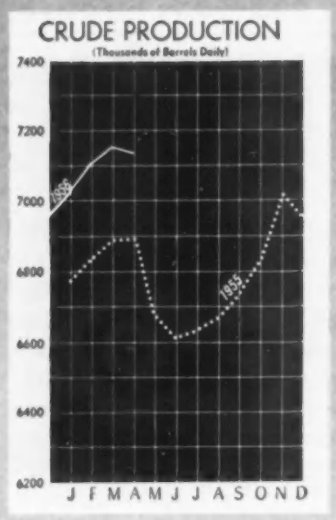
This alone was enough to have an unfavorable reaction on gasoline stocks. However, the situation was made even worse by the downward adjustment of fuel oil yields and a corresponding upward adjustment in gasoline yields. The result was too much gasoline. Hence the relative small decrease in motor fuel stocks, despite record seasonal consumption.

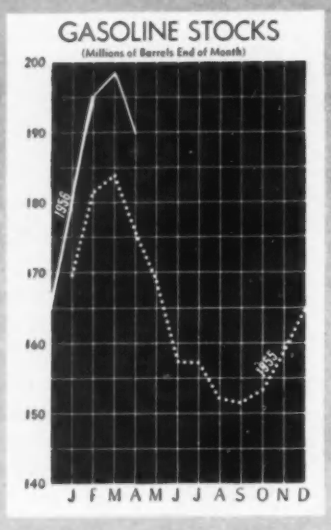
Gasoline inventories can be brought to proper levels if refiners will hold runs and motor fuel yields to reasonable levels during the next four to six weeks.

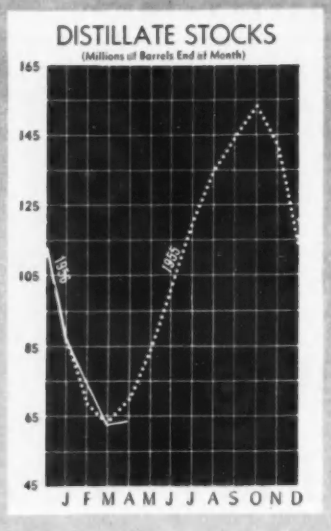
FOR A QUICK PICTURE OF ECONOMIC TRENDS and operating levels of the U. S. petroleum industry turn to the following two pages.

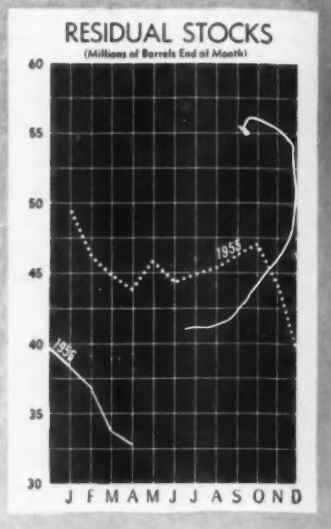
There you will find charts depicting the U. S. trend in all the industry's major operations. Individual charts compare the current year with year ago levels for U. S. crude production, runs to refinery stills, crude oil stocks, gasoline stocks, distillate fuel oil stocks, imports of oil. Then there are charts showing trends in wells completed, footage drilled, active drilling rigs, and active rotary rigs.

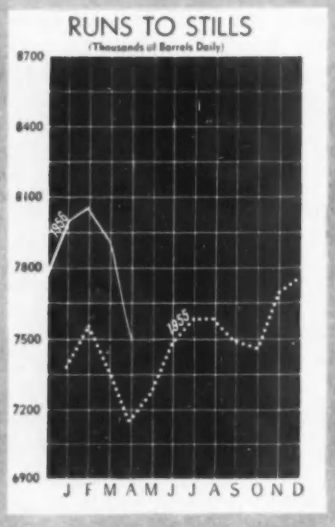
This is a regular monthly feature of WORLD OIL.

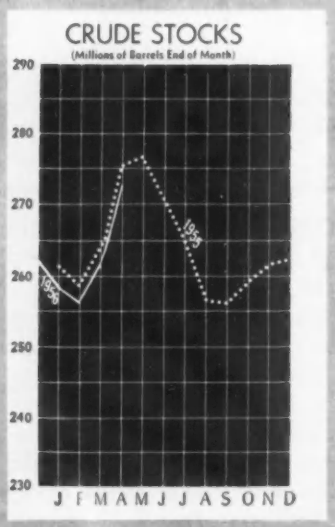












Petroleum Trends In U. S. . . .

By CECIL W. SMITH, World Oil Staff

U. S. Crude Production by States

(THOUSANDS OF BARRELS)

STATE or DISTRICT	DAILY AVERAGE PRODUCTION				TOTAL PRODUCTION First Four Months		
	April 1956	March 1956	April 1955	% Diff. April '56-'55	1956	1955	% Diff. '56-'55
Alabama	4.8	4.5	2.8	+ 71.4	578	442	+ 30.8
Arkansas	73.0	74.0	81.1	— 10.0	9,066	9,406	— 3.6
California	964.8	966.1	972.7	— 0.8	117,130	116,269	+ 0.7
Colorado	165.0	160.7	124.5	+ 32.5	19,509	14,681	+ 32.9
Florida	1.4	1.4	1.3	+ 7.7	166	154	+ 7.8
Illinois	230.2	232.8	224.3	+ 2.6	27,547	25,864	+ 6.5
Indiana	31.6	31.8	29.5	+ 7.1	3,599	3,490	+ 3.1
Kansas	335.1	343.3	336.4	— 0.4	40,994	40,890	+ 0.3
Kentucky	47.4	47.0	40.6	+ 16.7	5,747	4,701	+ 22.3
Louisiana	826.0	817.4	728.7	+ 13.4	98,110	85,953	+ 14.1
North Louisiana	120.9	121.1	116.6	+ 3.7	14,951	14,144	+ 5.7
South Louisiana	705.1	696.3	612.1	+ 15.2	83,159	71,809	+ 15.8
Michigan	28.8	29.7	31.2	— 7.7	3,706	3,827	— 3.2
Mississippi	111.8	110.8	96.0	+ 16.5	13,445	11,391	+ 18.0
Missouri	0.2	0.2	0.2	.....	21	23	— 8.7
Montana	53.7	52.4	44.3	+ 21.2	6,500	5,300	+ 22.6
Nebraska	38.5	30.1	22.6	+ 70.4	4,375	2,732	+ 60.1
Nevada	0.3	0.2	0.3	.....	28	24	+ 16.7
New Mexico	249.6	242.1	222.9	+ 12.0	29,472	26,579	+ 10.9
Southeast New Mexico	248.1	240.5	220.2	+ 12.7	29,221	26,242	+ 11.3
Northwest New Mexico	1.5	1.6	2.7	— 44.5	251	337	— 25.5
New York	10.1	9.6	8.1	+ 24.7	1,067	968	+ 10.2
North Dakota	26.7	36.3	23.7	+ 12.7	4,338	3,446	+ 25.9
Ohio	13.0	12.6	11.5	+ 13.0	1,527	1,323	+ 15.4
Oklahoma	600.9	618.5	560.9	+ 7.1	74,027	66,188	+ 11.8
Pennsylvania	18.9	18.3	23.6	— 20.0	2,466	2,696	— 8.5
South Dakota	0.1	0.1	0.1	.....	7	12	— 41.7
Tennessee	0.1	0.1	.....	.....	5	6	— 16.6
Texas	3,029.7	3,026.2	2,940.4	+ 3.0	369,474	361,074	+ 2.3
Dist. 1: South Central	55.0	54.4	54.5	+ 0.9	6,394	6,065	+ 5.4
Dist. 2: Middle Gulf	159.7	159.6	158.6	+ 0.7	19,377	18,983	+ 2.1
Dist. 3: Upper Gulf	452.8	455.4	467.4	— 3.1	55,309	56,704	— 2.5
Dist. 4: Lower Gulf-S.W.	248.6	252.3	249.3	— 0.3	30,251	30,860	— 2.0
Dist. 5: East Central	45.5	47.4	47.5	— 4.2	5,638	5,896	— 4.4
Dist. 6: Northeast	345.9	356.1	360.8	— 4.1	42,889	43,988	— 2.5
Dist. 7-B: North Central	160.5	162.6	141.1	+ 13.7	19,046	16,956	+ 12.3
Dist. 7-C: West Central	192.9	181.8	199.4	— 3.3	22,119	22,977	— 3.7
Dist. 8: West	1,060.2	1,051.7	967.2	+ 9.6	126,270	116,307	+ 8.6
Dist. 9: North	213.5	210.7	207.4	+ 2.9	25,100	23,597	+ 6.4
Dist. 10: Panhandle	95.1	94.2	87.2	+ 9.1	11,330	10,376	+ 9.2
Utah	4.9	5.2	5.7	— 14.0	666	656	+ 1.5
Virginia	0.1	0.1	.....	.....	8	4	+200.0
West Virginia	5.9	6.2	6.4	— 7.8	726	784	— 7.4
Wyoming	271.0	279.3	270.8	+ 0.1	34,058	32,163	+ 5.9
Total United States	7,143.6	7,157.0	6,810.6	+ 4.9	868,362	821,046	+ 5.8

Source: Bureau of Mines and API. Texas districts data from API and do not necessarily agree with state totals.

U. S. Wells Completed in April and First Four Months, 1956–1955

STATE or DISTRICT	NEW WELLS COMPLETED AND FOOTAGE DRILLED — DETAILS FOR APRIL: Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	TOTAL NEW WELLS: April, 1956	Mar., 1956	April, 1955	Total Footage April, 1956	DETAILS FOR JANUARY-APRIL — NEW WELLS: 1956	1955	Percent Diff.	FOOTAGE: 1956	1955	Rigs in Operation: April 30, 1956	Mar. 31, 1956	April 30, 1955
Alabama	2			5				7	5	7	68,287	24	27	— 11.1	206,702	115,776	14	15	3
Arizona													4	—100.0		16,136			
Arkansas	42		2	32				76	78	67	267,952	271	202	+ 34.2	884,635	675,396	48	52	38
California	130		4	43				177	178	240	827,018	726	788	— 7.9	3,408,710	3,787,546	223	223	251
Colorado	22		7	64				93	106	130	501,285	433	452	— 4.2	2,327,105	2,437,387	59	69	85
Florida									1			6	12	— 50.0	35,002	74,689			5
Georgia				1				1			3,550	1			3,550		2	2	
Idaho									1	1		1	2	— 50.0	4,528	7,305		1	
Illinois	147		1	170				318	237	306	757,031	1,063	1,083	— 1.9	2,510,046	2,612,418	265	240	268
Indiana	18			23	1			42	45	41	76,088	180	168	+ 7.1	311,438	262,040	84	75	98
Kansas	178		31	179			4	392	386	419	1,436,656	1,482	1,465	+ 1.2	5,405,847	5,374,776	455	449	518
Kentucky	67		16	66	1			150	136	125	211,444	568	451	+ 25.9	800,162	758,822	121	126	101
Louisiana	161	10	30	103				304	314	332	2,164,637	1,142	1,294	— 11.8	8,760,716	8,075,136	437	430	375
North Louisiana	80		13	42				135	116	149	483,711	413	677	— 39.0	1,544,471	1,881,174	77	86	87
South Louisiana	81	10	17	61				169	198	183	1,680,926	729	627	+ 16.3	7,216,245	6,193,962	360	344	288
*Gulf of Mexico	25		3	8				36	42	28	316,164	149	95	+ 56.8	1,355,506	893,689	68	75	50
Maryland																	3	2	2
Michigan	12		1	11				24	41	32	65,366	156	162	— 3.7	433,872	484,026	58	62	69
Mississippi	14	2	1	23				40	32	41	299,700	145	162	— 10.5	1,074,158	1,241,267	29	32	40
Missouri				1				1	13	4	1,000	15	17	— 11.8	13,595	9,719			3
Montana	13			11				24	29	15	158,777	129	87	+ 48.3	698,024	449,131	47	38	30
Nebraska	28			59				87	80	52	516,072	328	199	+ 64.8	1,866,562	1,140,226	45	48	38
Nevada				1				1			9,518	2	4	— 50.0	17,403	29,916	4	4	1
New Mexico	71	1	64	30				166	142	141	701,212	605	473	+ 27.9	2,785,543	2,042,478	203	188	143
New York	20				13			33	32	29	45,800	114	107	+ 6.5	162,400	147,931	52	50	47
North Dakota	17			8				25	21	21	173,849	94	72	+ 30.5	717,127	537,701	20	22	22
Ohio	56		12	26				94	73	93	248,039	346	336	+ 3.0	864,090	721,643	218	218	203
Oklahoma	430	4	31	211	4		10	690	728	635	2,511,414	2,790	2,272	+ 22.8	10,104,163	7,742,088	644	656	654
Oregon												1			12,880				1
Pennsylvania	24		30	16	21	1		92	106	67	233,203	386	238	+ 62.2	995,199	447,948	142	143	109
South Dakota				2				2		2	10,181	3	4	— 25.0	19,542	24,038	4	1	1
Texas	1,147	25	54	697	15	1	1	1,940	2,003	1,447	8,379,201	7,551	6,186	+ 22.1	31,943,768	27,040,595	1,439	1,473	1,336
Dist. 1: South Central	106	1	4	62				173	186	137	539,258	678	569	+ 19.1	1,866,560	1,535,494	71	77	59
Dist. 2: Middle Gulf	25	8	9	39				81	74	65	488,006	302	260	+ 16.2	1,856,025	1,570,163	57	51	42
Dist. 3: Upper Gulf	93	4	10	65				172	167	127	1,119,964	617	573	+ 7.7	4,052,192	3,681,814	157	165	132
*Gulf of Mexico									1	5		4	6	— 33.3	40,088	62,109	1	1	3
Dist. 4: Lower Gulf-S.W.	55	10	6	47				118	115	108	568,175	459	452	+ 1.5	2,371,176	2,342,376	77	73	69
*Gulf of Mexico				1				1			9,050	4	6	— 33.3	40,226	54,743	3	2	3
Dist. 5: East Central	2	1		20				23	25	17	66,782	90	98	— 8.2	292,496	401,659	8	7	12
Dist. 6: Northeast	42		7	36				85	60	45	412,153	295	196	+ 50.1	1,526,756	1,095,069	73	67	53
Dist. 7-B: North Central	143			134		1		278	273	261	999,876	1,118	1,043	+ 7.2	3,838,268	3,088,938	156	171	150
Dist. 7-C: West Central	78		2	31				111	127	91	487,714	434	414	+ 4.8	2,010,039	2,246,129	120	124	130
Dist. 8: West	286		2	61	4			353	390	286	1,985,482	1,356	1,173	+ 15.6	7,054,919	6,395,422	339	362	383
Dist. 9: North	244		5	189	11		1	450	484	230	1,318,943	1,795	1,072	+ 67.4	5,532,762	3,524,830	270	269	240
Dist. 10: Panhandle	73	1	9	13				96	102	80	392,848	407	336	+ 21.1	1,542,575	1,158,701	111	107	66
Utah	3			3				6	8	12	28,444	43	35	+ 22.8	199,939	177,621	16	21	16
Washington												1			7,493				
West Virginia	3		24	11				38	67	42	97,813	232	194	+ 19.6	620,365	507,873	170	175	184
Wyoming	46		2	20				68	71	47	310,736	309	226	+ 36.7	1,490,183	1,148,578	84	68	72
Total United States	2,651	42	310	1,816	55	2	15	4,891	4,933	4,348	20,104,273	19,147	16,722	+ 14.5	78,684,747	68,090,206	4,886	4,883	4,713
Total Western Canada	80		7	80			4	171	185	135	888,522	811	774	+ 4.8	3,920,301	3,377,880	159	173	100

*Gulf of Mexico wells are included in their respective District totals.

Drilling Rates at High Level

Year's operations hold 14.5 percent margin over 1955, with Gulf Coast contributing substantially.

DURING APRIL, the nation's drillers kept the fast drilling pace that has characterized this year's campaign from the start. Almost 4900 new wells were completed to advance the year's four-month total to a lead of 14.5 percent over last year's record activity.

A total of 4891 new wells was recorded as complete during April, which was slightly under the 4933 drilled in March, but considerably greater than the 4348 completed in April of last year.

In the first four months, 19,147 new wells were completed for a gain of 14.5 percent over the 16,722 wells in the same period of last year. In the same period, a total of 78,684,747 feet was drilled for an even greater increase of 15.6 percent over the 68,090,206 feet recorded in 1955's first four months.

Texas-Louisiana Gulf Coast, one of the great oil provinces of the nation, and which is featured in this issue of WORLD OIL, has contributed substantially to the nation's over-all drilling increase. In this region a total of 2107 wells has been drilled this year for a gain of 10.2 percent over the 1912 wells completed by the same time in 1955.

Very deep wells are the rule, rather than the exception, in this Gulf Coast Region, especially on the Louisiana side where each new well drilled is approximately 10,000 feet deep on the average. Wells in this region, so far this year, have accounted for 11 percent of the nation's total, while the amount of footage drilled in these wells amounted to 19.7 percent of all footage drilled.

An interesting part of this Gulf Coast activity is the drilling in open waters of the Gulf of Mexico, which is steadily increasing in volume. This year, 157 wells have been drilled offshore, against 107 in the same period of 1955. At the end of April, there were 72 drilling units at work offshore—68 of them off the Louisiana shore. Comprising this total were 16 mobile units, 36 platforms and tenders, and 20 self-contained platforms.

Wildcat Drilling—In April and First Four Months, 1956-1955

STATE or DISTRICT	MONTH OF APRIL, 1956						FIRST FOUR MONTHS, 1956—1955								
	New Fields			Total Discoveries	Dry Wildcats	Total Wildcat Tests	New Fields			Total Discoveries		Dry Wildcats		Total Wildcat Tests	
	Oil	Distillate	Gas				Oil	Distillate	Gas	4 Mo. 1956	4 Mo. 1955	4 Mo. 1956	4 Mo. 1955	4 Mo. 1956	4 Mo. 1955
Alabama	..	..	..	....	1	1	...	..	1	1	...	6	27	7	27
Arizona	..	..	..	....	....	....	...	..	..	....	....	....	4	....	4
Arkansas	1	..	..	1	12	13	2	..	2	4	4	40	39	44	43
California	1	..	..	1	26	27	1	..	1	2	7	88	88	90	95
Colorado	2	..	1	3	37	40	9	..	3	12	24	187	235	199	259
Florida	..	..	..	....	....	....	...	..	..	....	....	6	11	6	11
Georgia	..	..	..	....	1	1	...	..	..	....	....	1	....	1	....
Idaho	..	..	..	....	....	....	...	..	..	....	....	1	2	1	2
Illinois	5	..	..	5	88	93	7	..	..	7	4	262	191	269	195
Indiana	..	..	..	....	4	4	1	..	..	1	7	42	39	43	46
Kansas	13	..	4	17	99	116	61	..	9	70	59	317	263	387	322
Kentucky	1	..	..	1	13	14	1	..	..	1	7	45	24	46	31
Louisiana	2	1	2	5	46	51	7	10	5	22	15	160	133	182	148
North Louisiana	..	..	..	....	18	18	...	..	..	....	1	52	49	52	50
South Louisiana	2	1	2	5	28	33	7	10	5	22	14	108	84	130	98
Michigan	..	..	..	....	7	7	2	..	..	2	2	48	64	50	66
Mississippi	..	..	..	....	12	12	...	1	..	1	2	55	57	56	59
Missouri	..	..	..	....	....	....	...	..	..	....	....	9	11	9	11
Montana	..	..	..	....	5	5	4	..	1	5	1	36	28	41	29
Nebraska	2	..	..	2	41	43	13	..	..	13	14	151	74	164	88
Nevada	..	..	..	....	....	....	...	..	..	....	....	....	3	....	3
Mexico	5	..	..	5	19	24	12	..	1	13	12	60	44	73	56
North Dakota	1	..	..	1	5	6	5	..	..	5	...	21	12	26	12
Ohio	..	..	..	....	1	1	...	..	..	....	1	2	9	2	10
Oklahoma	7	1	4	12	59	71	36	8	10	54	41	238	172	292	213
Oregon	..	..	..	....	....	....	...	..	..	....	....	1	....	1	....
South Dakota	..	..	..	....	2	2	...	..	..	....	....	3	4	3	4
Texas	44	6	10	60	404	464	172	17	32	221	218	1,568	1,326	1,789	1,544
Dist. 1: South Central	3	..	1	4	45	49	11	..	4	15	10	180	138	195	148
Dist. 2: Middle Gulf	1	2	..	3	24	27	4	3	1	8	12	78	75	86	87
Dist. 3: Upper Gulf	1	1	1	3	38	41	7	7	4	18	17	149	131	167	148
Dist. 4: Lower Gulf-S.W.	2	2	2	6	29	35	4	4	6	14	16	123	132	137	148
Dist. 5: East Central	..	..	..	....	10	10	...	..	..	....	5	44	44	44	49
Dist. 6: Northeast	2	..	1	3	22	25	6	1	2	9	1	79	50	88	51
Dist. 7-B: North Central	14	..	..	14	82	96	58	..	3	61	54	347	299	408	353
Dist. 7-C: West Central	3	..	1	4	21	25	16	..	2	18	14	80	84	98	98
Dist. 8: West	5	..	1	6	37	43	30	..	1	31	33	143	148	174	181
Dist. 9: North	12	..	2	14	90	104	31	..	5	36	52	319	211	355	263
Dist. 10: Panhandle	1	1	1	3	6	9	5	2	4	11	4	26	14	37	18
Utah	..	..	..	....	3	3	1	..	2	3	3	31	24	34	27
Washington	..	..	..	....	....	....	...	..	..	....	....	1	....	1	....
West Virginia	..	..	..	....	....	....	...	..	..	....	3	....	8	....	11
Wyoming	2	..	..	2	4	6	3	1	1	5	9	75	45	80	54
Total United States	86	8	21	115	889	1,004	337	37	68	442	433	3,454	2,937	3,896	3,370

Wildcatting Still Gaining

Year's tests boosted to 15.6 percent over last year's all-time record.

A TOTAL of 1004 wildcats was completed in the U. S. during April, and 115 hit the mark to be rated as discoveries. One of these successful tests was outstanding for it broke every existing world's depth record. This unique well is the deepest ever drilled and is producing from the greatest depth.

April's wildcatting activity gave an additional boost to the year's record, which has enjoyed a substantial lead over last year's since the outset. Since the first of the year, a total of 3896 wildcat tests has been completed, and that was 15.6 percent more tests than the 3370 drilled in the same four months of 1955.

Although the current wildcat campaign has topped last year's by a large margin, the successful results have not kept pace. In the first four months of 1956, 442 new discoveries were made for a score of 11.3 percent of the total drilled. A year earlier, a slightly fewer 433 discoveries amounted to 12.8 percent of all wildcat wells drilled. April's success rate of 11.5 percent was only slightly higher than the year's average.

The new wildcat that now holds all the world's depth records was drilled in the swamps of Southern Louisiana by Richardson & Bass, John W. Mecom and Freeport Sulphur Company. The well was started in early 1955, and 14 months later was completed as the deepest hole—22,570 feet, and the discoverer of the world's deepest oil production—21,465 feet.

The other 114 of the nation's wildcats completed successfully during April opened 85 additional oil fields, 21 natural gas fields and eight new gas-distillate areas. But the remaining 889, or 88.5 percent of the total, were abandoned as failures.

Comparison of this year's exploratory results with last year's shows little difference. In four months, 337 new oil fields were found to last year's 332; 68 new natural gas areas to 63; and 37 gas-distillate discoveries to the earlier period's 38. The big difference was the 3454 failures this year to 2937 in the same period of 1955.

Summary of Results of Wildcat Drilling

ITEM	April 1956	Mar. 1956	FOUR MONTHS January-April 1956	1955	Percent Diff.
New Field Discoveries:					
Oil	86	95	337	332	+ 1.5
Distillate	8	14	37	38	— 2.6
Gas	21	13	68	63	+ 7.9
Total Discoveries	115	122	442	433	+ 2.1
Dry Wildcats	889	872	3,454	2,937	+ 17.6
Total Wildcats	1,004	994	3,896	3,370	+ 15.6
Percent Productive	11.5	12.3	11.3	12.8	.....
Percent Dry	88.5	87.7	88.7	87.2	.....

A Gulf Coast Feature . . .

Condensed from a publication on Gulf Coast Tectonics now in preparation.

Gulf Coast Tectonics

- The most important tectonic process in this area was the subsidence of the earth crust, beginning in the early Mesozoic, formed an older and the present Gulf Coast geosyncline.
- In connection with this general downwarp, regional structures were formed, which in turn created favorable conditions for the formation of local gravity flow structures.
- Gravity flow tectonic is responsible for the formation of most or all of the local structures and is considered to be the next important tectonic process active in the Gulf Coast.
- Closely associated with these local gravity flow structures are normal, gravity type faults which, regardless of their size, are believed to be the result of, but not the cause of, gravity flow folding.
- During periods of increased subsidence or during periods of stabilization or minor reversals of subsidence, intrusive and extrusive igneous activities occurred within the geosynclinal area.
- The intrusive activities created large uplifts of local or more regional nature. As the number of such uplifts is small and their occurrance restricted, igneous tectonic played only a minor role in the structural history of the Gulf Coast.

By DR. MAX BORNHAUSER
Dillard-Waltermire, Inc.
Houston

THE QUESTION when and where oil and gas accumulated in the Gulf Coast sediments finds its answer not only in the detailed knowledge of the stratigraphy but also in the structural history of this area. Gulf Coast geologists have, until recently, restricted their research efforts mostly to the solution of stratigraphic and sedimentation problems, a restriction imposed upon them because sufficiently detailed subsurface information was lacking for structural studies. However, during the last decade subsurface information has increased to the point where such studies are now feasible, and they have become an effective tool in "structural finding" in direct competition with geophysical exploration methods, which so far have dominated this field of exploration. Although Gulf Coast geologists have added to and steadily improved their subsurface structural picture during the past years, they did neglect to study the basic geological processes which are involved in the formation of the Gulf Coast structures; and which have to be properly understood if one wants to study the structural history of this area. Only the salt domes have received adequate consideration in this respect and some valuable contributions on this subject have been published by both geophysicists and geologists. (Some of these publications are listed at the end of this article.)

The first step in determining the structural history of the Gulf Coast is

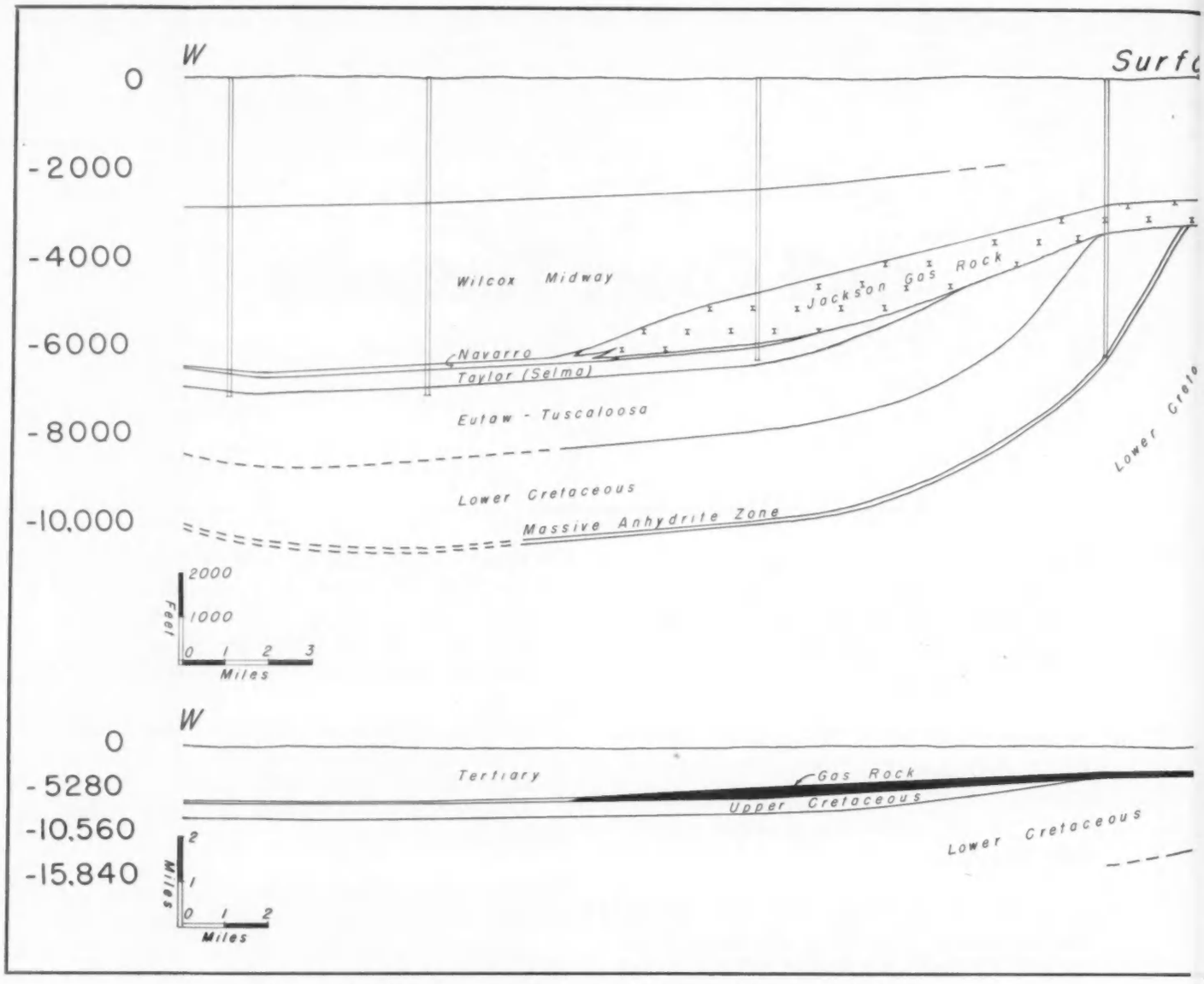


FIGURE 1—West-East cross-section, Jackson Uplift-Mississippi (After T. McGlothlin).

the proper distinction of all structural types present in this area. Table 1 shows the main structural types recognized by the writer; they are tabulated in such order to indicate also their genetic relationship. Only these structural types are shown which were directly or indirectly formed by diastrophic forces, that is, by forces causing major deformations of the earth crust.

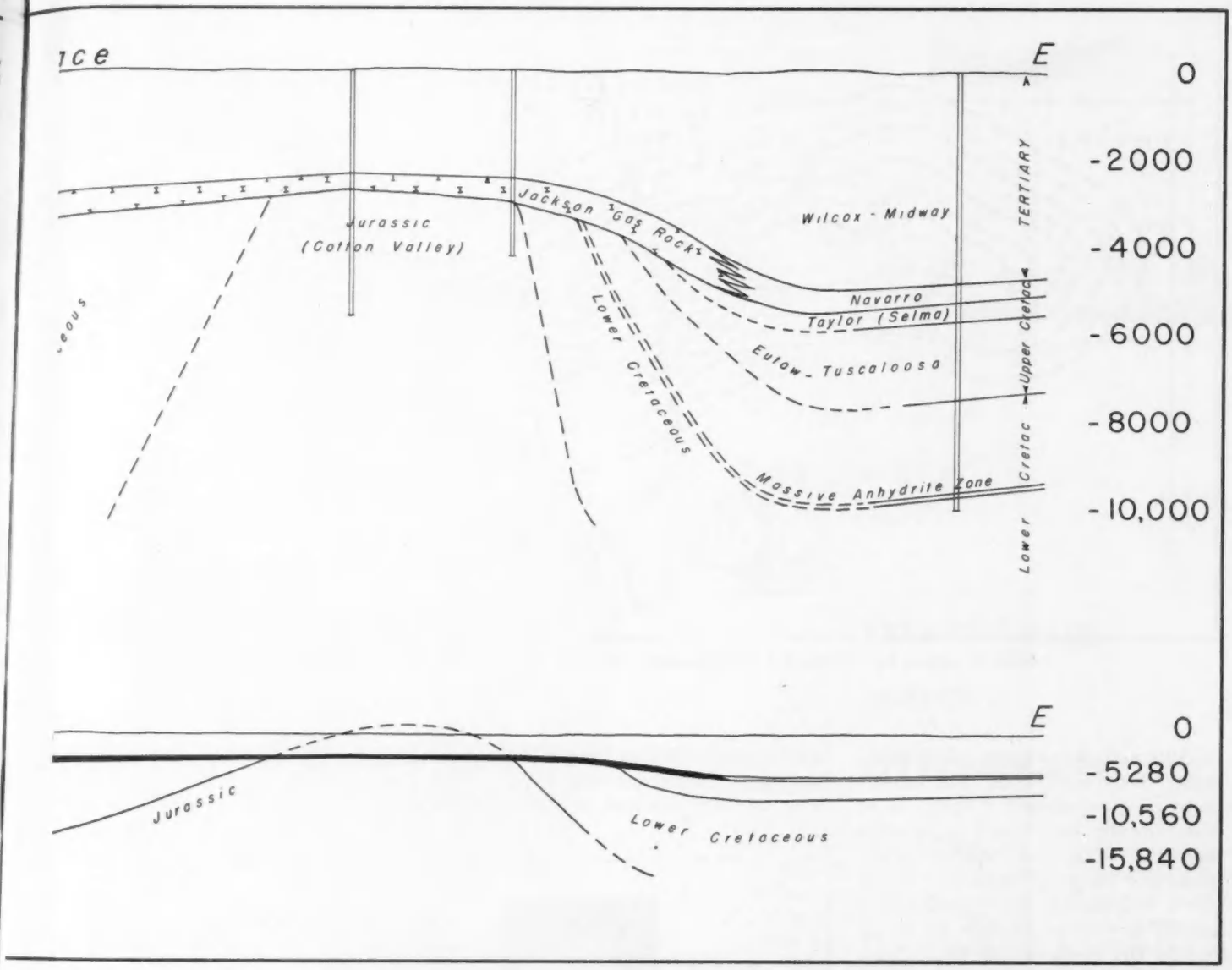
In the following paragraphs these different types and their possible genesis will be discussed in somewhat greater detail.

I. Gulf Coast Geosyncline

The Gulf Coast geosyncline is the largest structural type known. All other contemporaneous structures are subordinate to this unit and their formation is directly or indirectly the result of the formation of this geosyncline. The structural history of the Gulf Coast area of Texas, Louisiana, and Mississippi therefore is essentially the development of this Gulf Coast geosyncline.

The term "Gulf Coast Geosyncline" was introduced by D. C. Barton and co-authors[1] in 1933. These authors restricted it to beds of Tertiary and younger age; later information, however, indicated that there exists probably an older geosyncline in this area which is of Jurassic and Lower Cretaceous age. The Upper Cretaceous divides the two geosynclinal periods and it is this division which marks the most significant structural event in the development of the Gulf Coast geosynclines. Another important event took place at the end of Eocene time when the entire interior Gulf Coast belt was uplifted and added to the border or main land. In connection with this regional uplift a shifting (or narrowing) and a considerable deepening of the geosyncline occurred, placing the axis of the geosyncline roughly parallel to the present coastline. The exact position of this axis is, however, still in dispute.

Most structural geologists today agree that a geosyncline is formed as a result of subcrustal movements. Such movements, the cause and the nature of which are still two of the major problems of geology, induce a



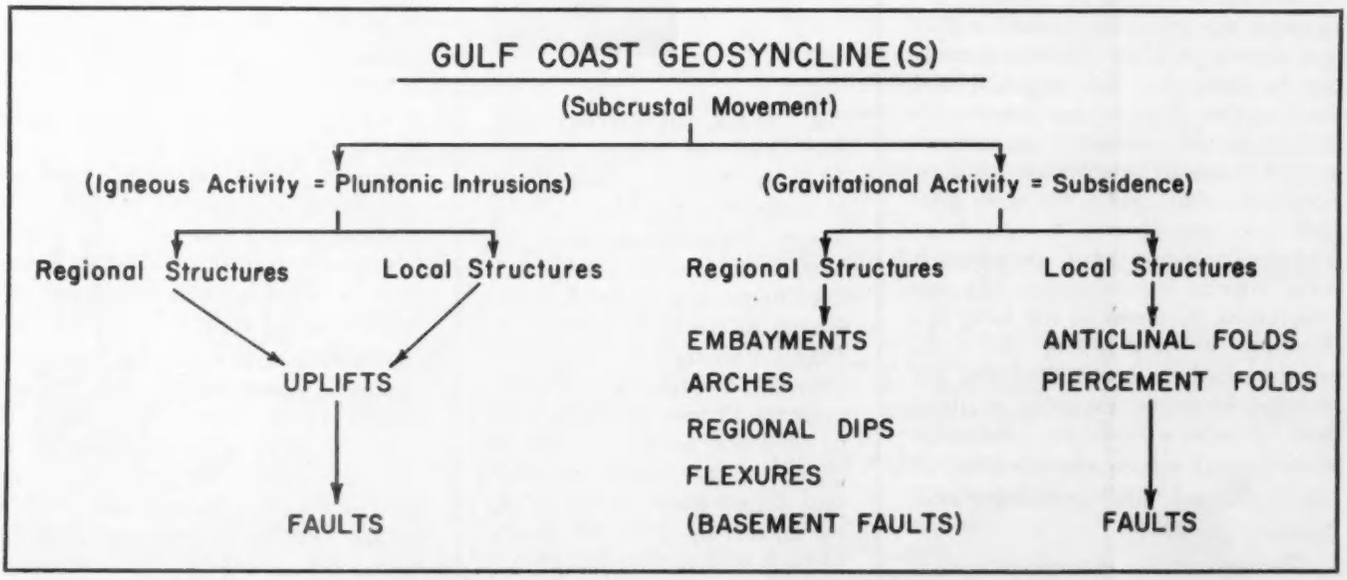


TABLE 1—Tabulation of Gulf Coast structural types.

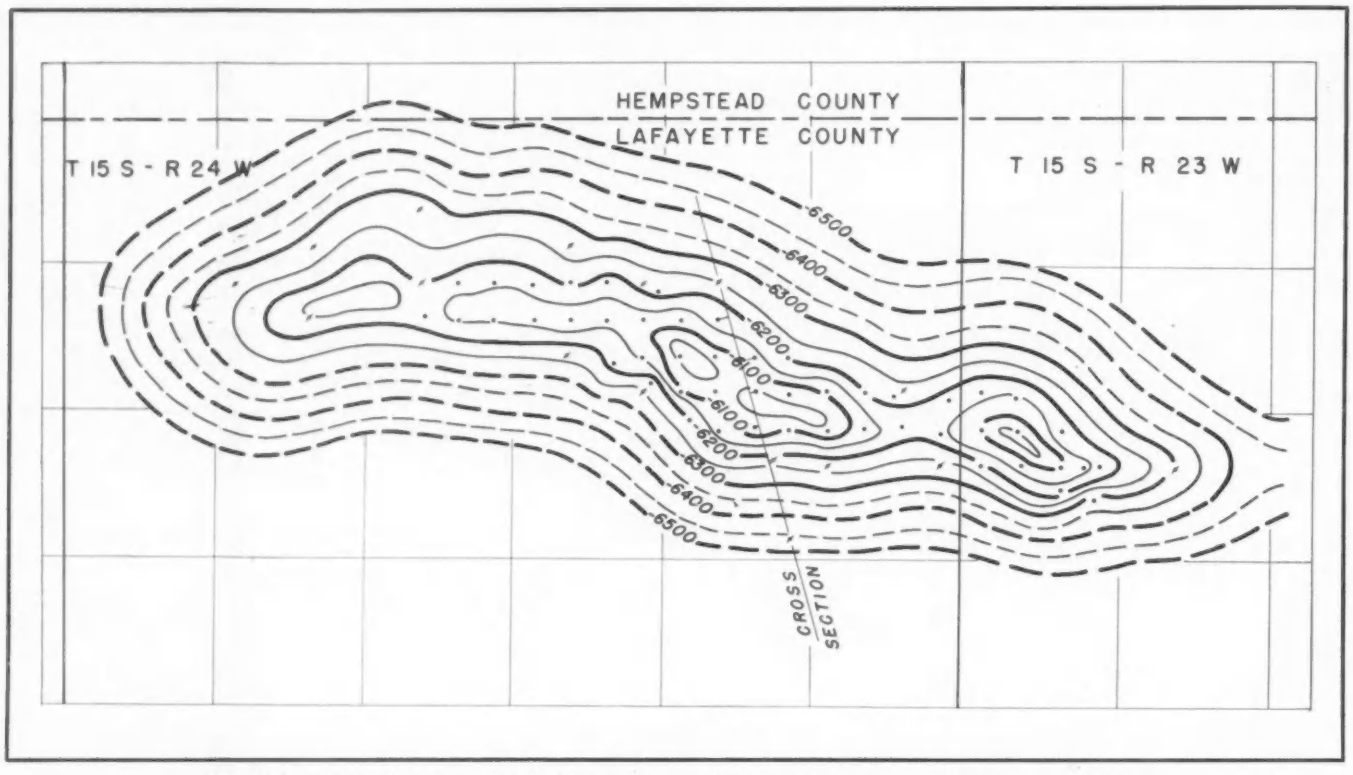


FIGURE 2—Midway field located in Lafayette County, Arkansas. Top smackover lime, interval: 50 feet.

widespread breakdown (or subsidence) of the earth crust. The subsidence, a gravitational activity, is at times locally interrupted by igneous activities in form of plutonic intrusions and volcanic extrusions. Structures, originating from gravitational as well as igneous activities are found within the limits of the Gulf Coast geosyncline.

II. Structures Formed by Igneous Activity.

Structures formed by plutonic intrusions are generally termed *uplifts* (or domes) and are divided, according to their size, into regional and local uplifts. There is no genetic difference between these two types, however. The main characteristic features, common to all uplifts, are their relative large size, circular to oval shape and the presence of a pronounced local angular unconformity. The unconformity is caused by the local upbending (or folding) of the sedimentary beds in connection with the magma intrusion, exposure of these beds to submarine or even subaerial erosion and subsequent covering of the denudated "hill" by younger sediments.

The best known example of a local uplift is the Jackson Dome of central Mississippi, which was formed during late Upper Cretaceous time. Figure 1 shows two cross-sections of this dome after McGlothlin,[2] one in an exagerated vertical, the other in the same vertical and horizontal scale.

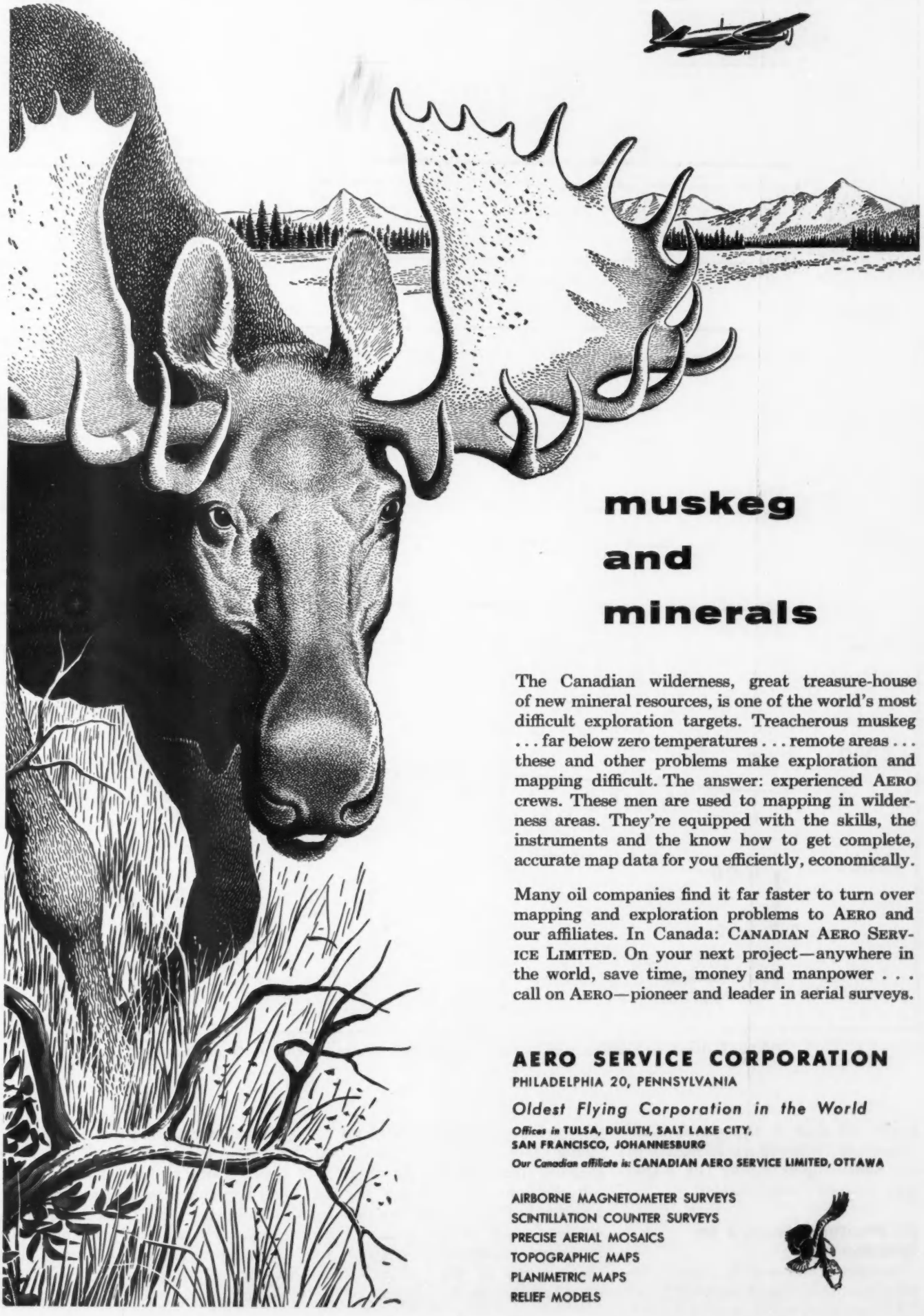
Faulting of the sedimentary beds as the result of an intrusion is a rare and restricted feature on Gulf Coast uplifts. The Arkansas-Graben is considered to be related with and formed during a more regional uplift in southern Arkansas and northeastern Louisiana at the close of Lower Cretaceous times. This Graben, a rift-valley type feature, starts in southwestern Arkansas and extends about 50 miles northeasterly where it appears to turn to a southeasterly direction following the axis of the uplift.

Volcanic extrusions are responsible for the formation of very minor local structures ("serpentine plugs"); they contributed, however, considerable amounts of volcanic material to the Gulf Coast sedimentary column in the form of volcanic ashes and decomposition products thereof.

While igneous activities played a relatively minor role in the geologic history of the Gulf Coast area and produced only a small number of structures, these few structures have been and still are of some importance to the petroleum geologist. For instance the Woodbine sand oil accumulation in the East Texas field, the

About the Author

DR. MAX BORNHAUSER, geologist for Dillard-Waltermire, Inc., was awarded a Ph.D. in geology at the University of Berne, Switzerland, in 1926. That same year he joined Shell Oil Company in Holland, transferring to the U. S. in 1930. In 1934 Bornhauser became affiliated with Continental Oil Company as district geologist, and in 1948 was named geologist in charge of the Gulf Coast division Exploration Research department. In 1952 he joined Dillard-Waltermire, Inc.



muskeg and minerals

The Canadian wilderness, great treasure-house of new mineral resources, is one of the world's most difficult exploration targets. Treacherous muskeg . . . far below zero temperatures . . . remote areas . . . these and other problems make exploration and mapping difficult. The answer: experienced AERO crews. These men are used to mapping in wilderness areas. They're equipped with the skills, the instruments and the know how to get complete, accurate map data for you efficiently, economically.

Many oil companies find it far faster to turn over mapping and exploration problems to AERO and our affiliates. In Canada: CANADIAN AERO SERVICE LIMITED. On your next project—anywhere in the world, save time, money and manpower . . . call on AERO—pioneer and leader in aerial surveys.

AERO SERVICE CORPORATION
PHILADELPHIA 20, PENNSYLVANIA

Oldest Flying Corporation in the World

Offices in TULSA, DULUTH, SALT LAKE CITY, SAN FRANCISCO, JOHANNESBURG

Our Canadian affiliate is: CANADIAN AERO SERVICE LIMITED, OTTAWA

AIRBORNE MAGNETOMETER SURVEYS
SCINTILLATION COUNTER SURVEYS
PRECISE AERIAL MOSAICS
TOPOGRAPHIC MAPS
PLANIMETRIC MAPS
RELIEF MODELS

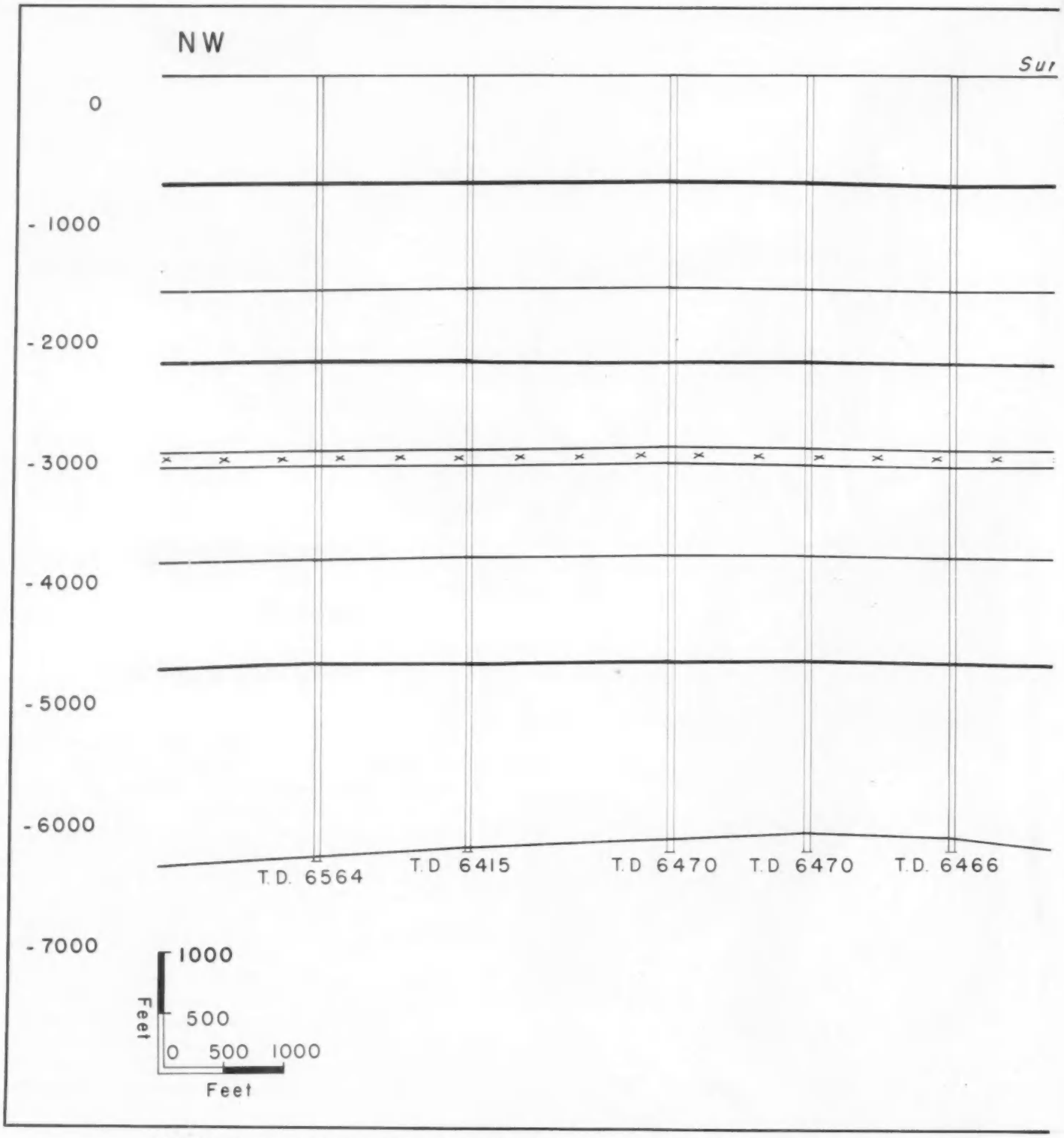


FIGURE 3—Northwest-Southeast cross-section of Midway field located in Lafayette County, Arkansas.

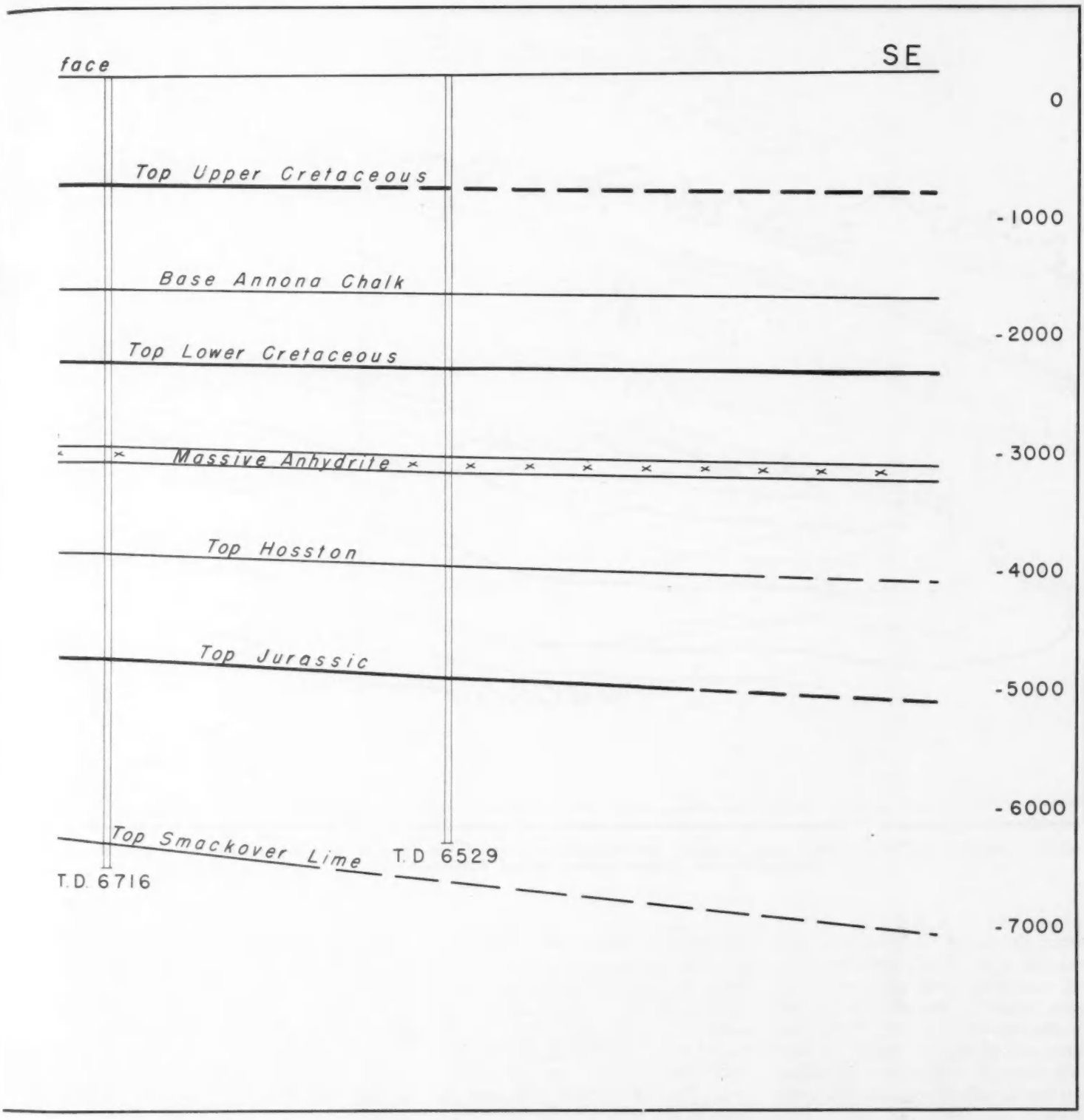
largest oil field in the greater Gulf Coast area, followed the formation of the Sabine uplift during late Eagleford (Upper Cretaceous).

III. Structures Formed by Subsidence

Structures formed in connection with the formation of the Gulf Coast geosyncline are also divided into regional and local structures. The regional structures are the direct result of the formation of this syncline, whereas local structures are only an indirect result of this event. Their formation is dependent not only on the presence of the regional structures but also on the presence of specific sedimentary conditions indicating a certain degree of genetic difference between local and regional structures.

(A) Regional Subsidence Structures:

Sedimentary beds, deposited in the geosynclinal area are deformed with progressive subsidence from their original nearly horizontal position to assume a *regional dip*. The rate of



regional dip, usually expressed in feet per mile, can be determined fairly accurately for beds at shallower depth, and ranges from a few feet per mile for the more recent beds to 250 feet or more for older beds. With increasing depth, however, the regional dip becomes obscured and almost indeterminable due to the influence of local structures which become increasingly more numerous and more pronounced with depth.

Wherever the normal regional dip increases sharply on a regional scale, a *flexure* is formed. In the Gulf Coast area flexures are also referred to as hinge lines because they are usually connected with a considerable downdip increase of the sedimentary section. The best known such feature is the "Frio-Vicksburg flexure," which trends from eastern Starr County northeastward, parallel the present coastline at least as far as Brazoria County. It should be pointed out, however, that the application of the term flexure to this zone of rapid in-

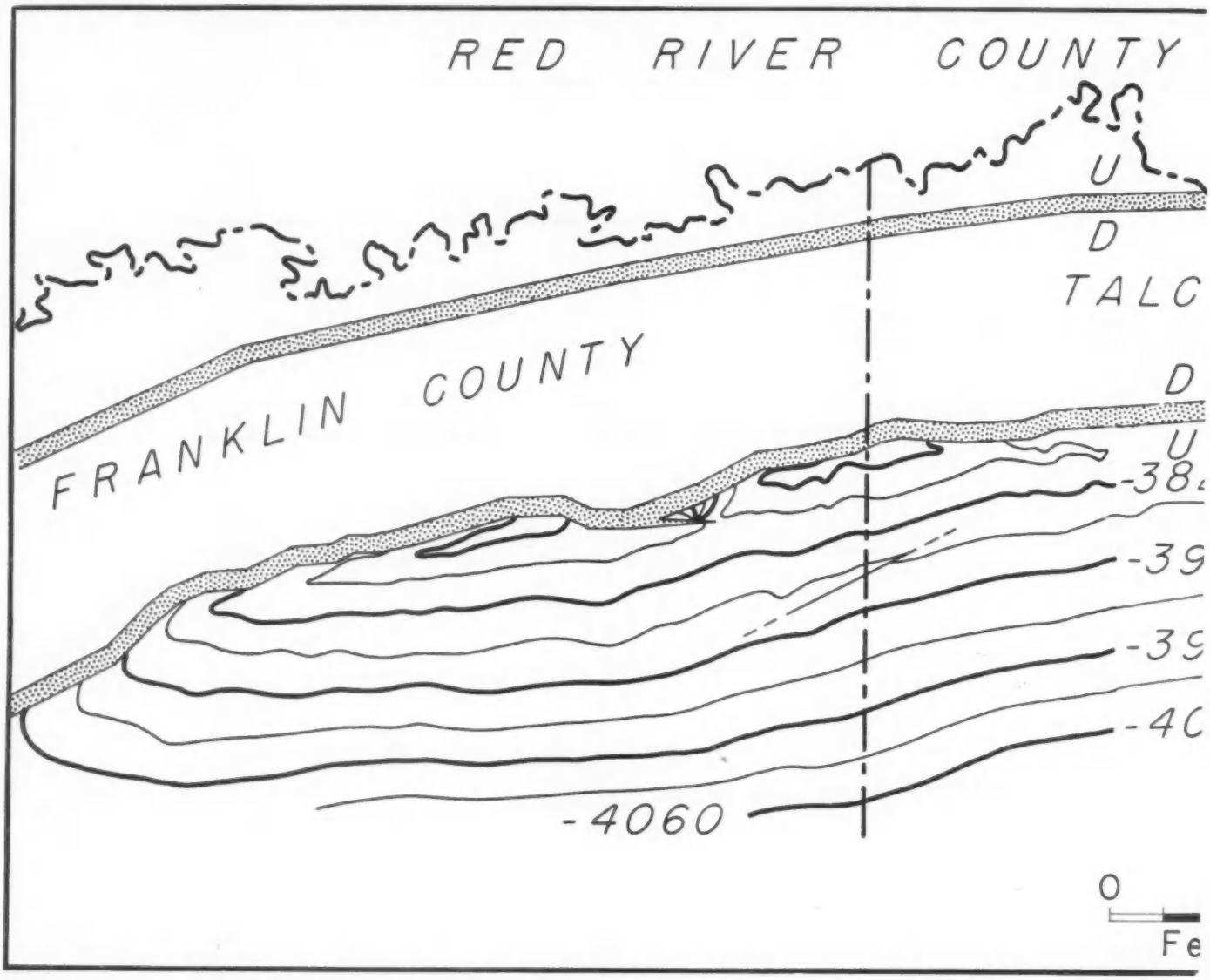


FIGURE 4—Structure map of Talco area located in Franklin and Titus counties, Texas. (After Wendlandt and Shelby) Contoured on base of Goodland limestone. Contour interval is 40 feet. Datum—sea level.

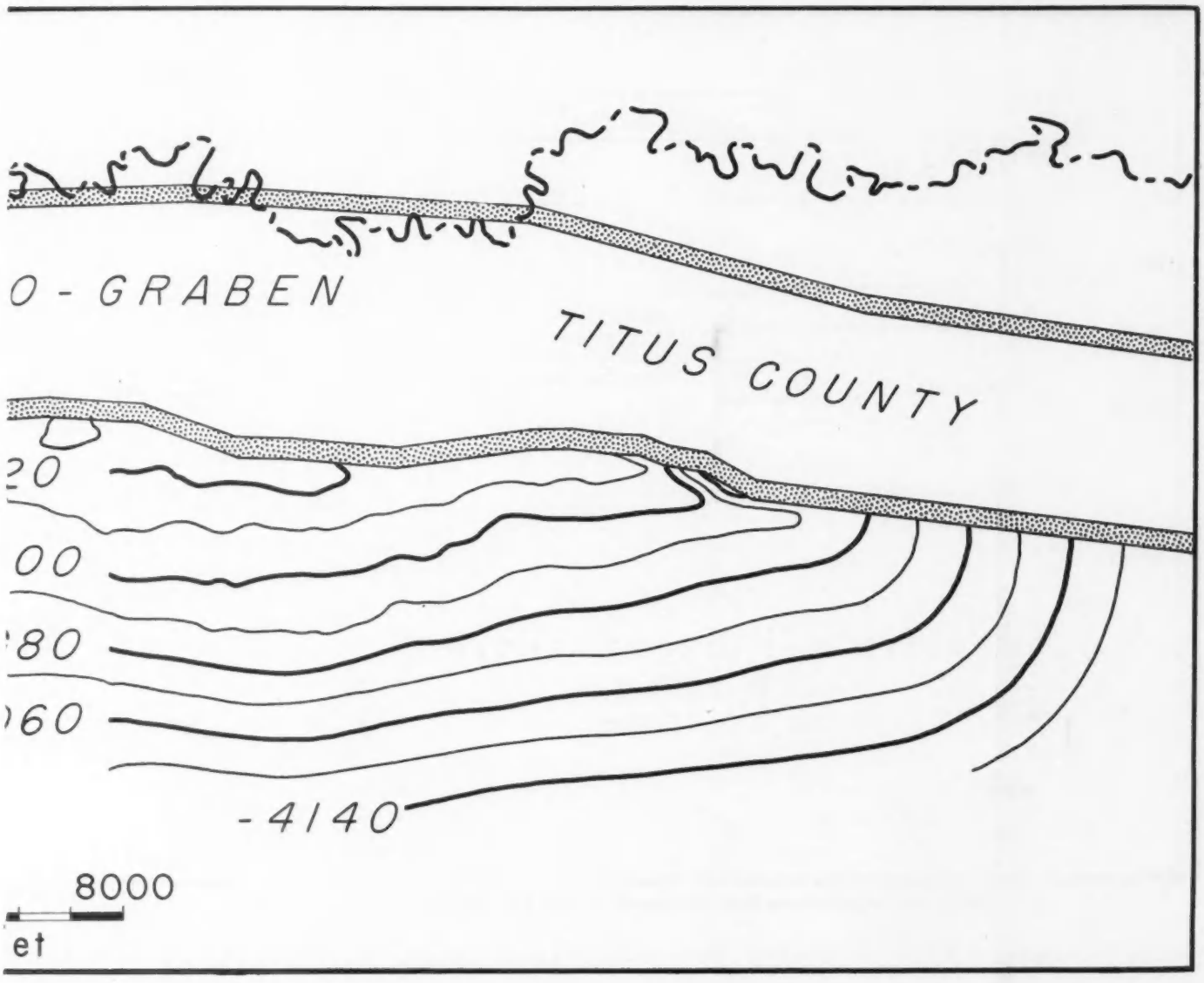
crease of sedimentary thickness does not follow too closely the usual definition of flexure. A flexure may have been formed in the older beds prior to the deposition of the Frio-Vicksburg sediments and these younger beds show now merely a somewhat increased regional dip over this older flexure.

Within the area affected by general subsidence, certain more localized areas may subside faster than adjoining ones, thus creating *basins* or *embayments,* which are separated from each other by *arches* or plateaus. Examples of such regional differential subsidence features are the Rio Grande embayment of South Texas and the East Texas Basin, the San Marcos Arch separating these two synclinal features.

In the beginning of a geosynclinal development, considerable faulting occurs in the basement complex which forms the floor of the deepening geosyncline. Such *basement faults* develop on a regional pattern, usually extend over considerable distance and their displacement may be rather large. No examples of this type of faulting are known in the Gulf Coast of Texas and Louisiana, although it is suspected that the flexures and hinge lines just described may indicate the location and may be the shallow expression of deeper buried basement faults.

(B) Local Subsidence Structures:

While local structures formed by igneous instrusions are relatively small in number but large in size, local structures formed in connection with geosynclinal subsidence are very numerous but relatively small in size. They are divided into simple *anticlinal folds* and *piercement (diaper) folds,* the latter representing a special case of anticlinal folding. Usually, the sedimentary beds involved in the formation of these two types of folds were also faulted and the ensuing fault patterns, although sometimes very simple, can reach a very high degree of complication. The formation of these *subsidence faults* are an integrate part of the folding process whether it forms anticlines or piercement domes. (Both types of folds have been and still are the most extensively explored local structures for oil and gas accumulation, and these structural types will continue to provide the future oil and gas reserves of the Gulf Coast area, including its offshore portion.)



1. Anticlinal Folds:

The anticlinal fold has a narrow, elongated lens-like shape; it is usually more than twice as long as wide. It is always associated with a syncline the size of which corresponds more or less to the size of the anticline. There are no local angular unconformities of any significance present, the most typical feature of these folds being a gradual, but sometimes considerable, increase of structural relief with depth. This increase is entirely due to a gradual thickening of individual sedimentary beds on the flanks of the fold, the thinnest section being present over the crest. The increase in thickness, which varies from a few feet to several hundred feet per 100 feet of section over a one-mile distance, can be attributed (1) to differential compaction, (2) to locally increased sedimentation in the synclinal areas, (3) to plastic flow of the sediments into the synclinal area or, as it is most likely the case, it should be attributed to a combination of two or all three of these factors. Differential compaction, however, is considered to play the lesser or least important part in such combinations.

The local increase in sedimentation or the local plastic flow of sediments is induced by local differential subsidence, also referred to as downbuilding or downfolding. Local differential subsidence which causes the formation of folds is in turn caused by the plastic flow of a larger body of incompetent sediments on a more regional scale. This explanation of the formation of Gulf Coast folds (anticlines as well as synclines) invokes the theory of gravity flow, a theory which had been advanced already in the last century but found better recognition among structural geologists only during the last two decades. This theory of folding process simply states that folding of sedimentary beds is caused by flowage of incompetent sediments on a sloping surface. The weight of the sedimentary column provides the gravity force which acts in vertical direction and places the sediments under stress. The sloping surface, which may be represented by regional dips, a flexure or some structural or topographic features of the basement complex creates component forces, one of which acts parallel to the sloping surface; the flow movement of the incompetent bed follows the direction of this component force. The gravity flow theory is built on the

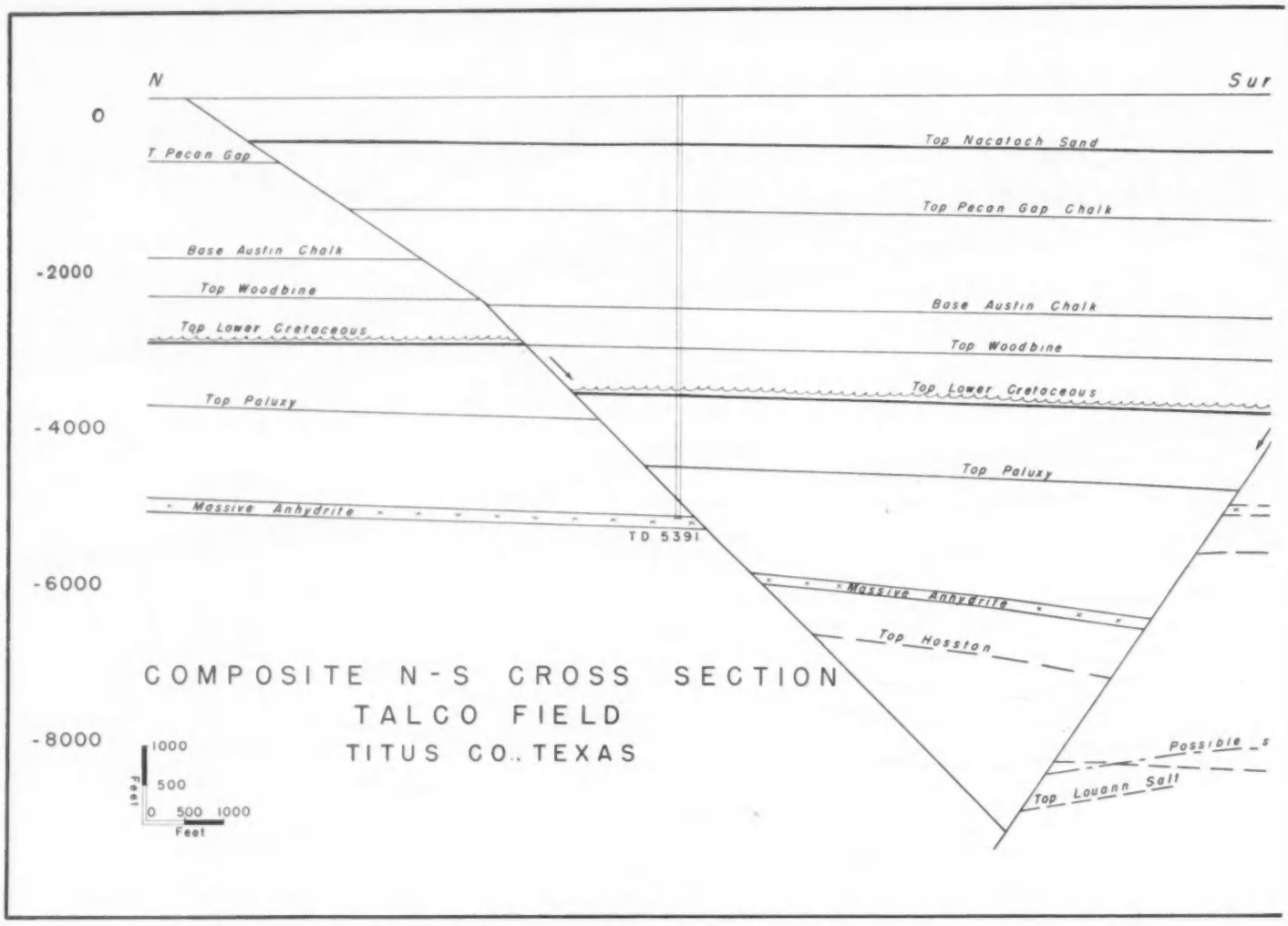


FIGURE 5—Composite North-South cross-section of Talco field located in Titus County, Texas.

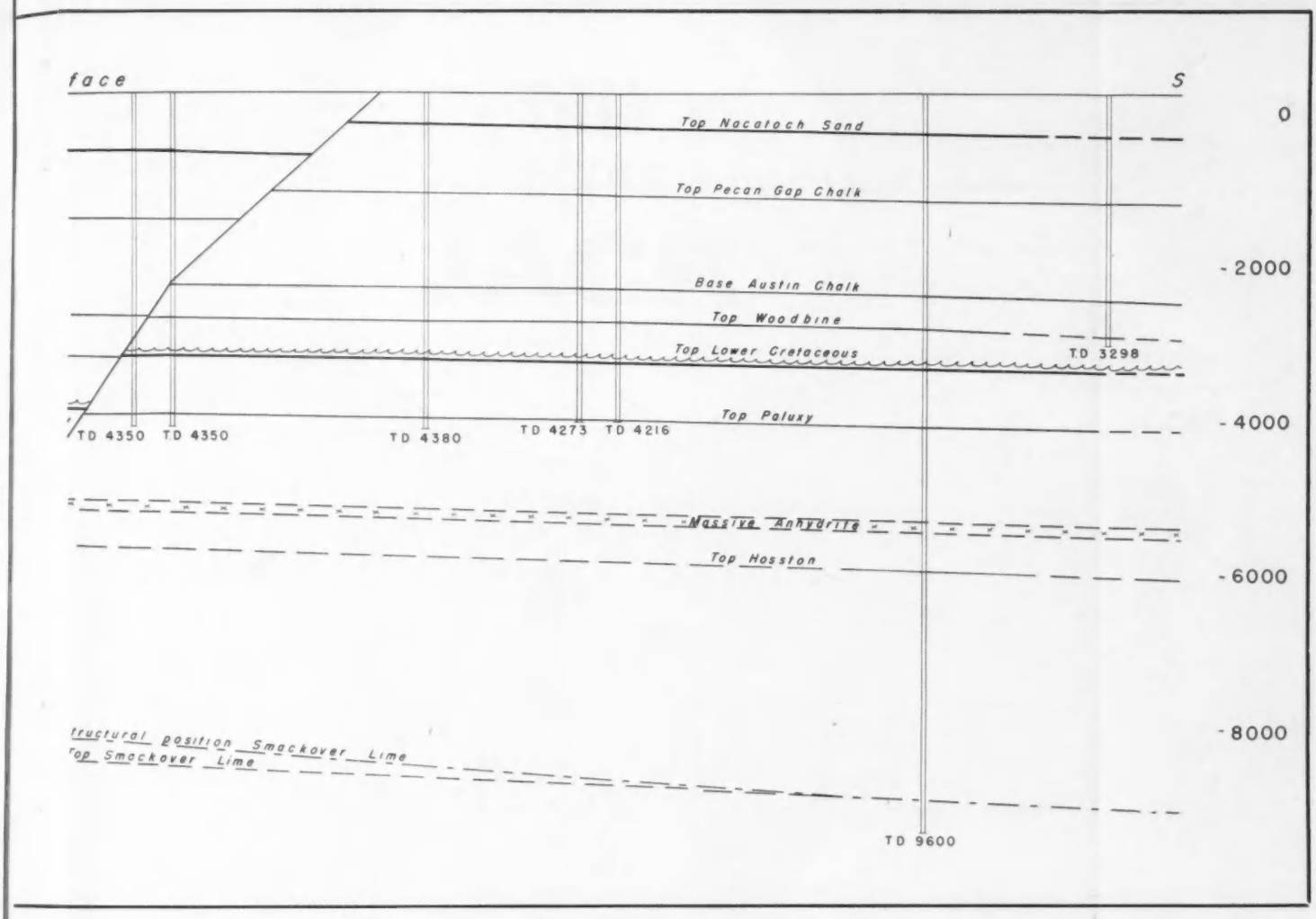
basic condition that sedimentary beds, in order to flow, must behave in geologic times like viscous fluids. That sediments can be considered to be in such physical state during geologic times has been demonstrated by Hubbert[3] with his studies of scale models of geologic structures, and is today a more or less accepted fact.

Sedimentary beds which are most likely involved in gravity flow in the Gulf Coast are rocksalt and shales. These sediments will commence flowing slowly under relatively small overburden as soon as the surface on which they are resting has a sufficient inclination, that is, has subsided sufficiently to permit this flow.

G. M. Knebel Theo A. Link

AAPG and SEPM Meet

The annual meeting of the American Association of Petroleum Geologists and the Society of Economic Paleontologists was attended by more than 2500 participants during the 1956 convention in Chicago in April. It was reported that this was a record attendance when compared with previous Chicago sessions. The registration list took on a similarity to a United Nations' activity as representatives traveled from numerous parts of South America and Europe. Shown (left) is G. M. Knebel, exploration manager for the Standard Oil Company of New Jersey and outgoing president of the organization; at right is Theo A. Link, consultant from Calgary, Alberta, incoming president.



During this process of flow, the sedimentary body in motion will form anticlines and synclines, a fact which has been demonstrated with experimental models by Rettger.[4]

Salt flow is responsible, if not completely, then at least partially, for the formation of the anticlinal folds of southern Arkansas (Figures 2 & 3). These folds represent the simplest type of anticlinal fold and, probably due to the gentleness of folding, no faulting occurred in the beds folded together with the salt. However, where folding is more intense, faulting in the overburden beds becomes an important and sometimes dominant feature. It affects not only the beds over the anticlines, but also beds in the adjoining syncline. The Talco-Graben of Franklin and Titus counties, Texas, served as a good example of a faulted syncline adjoining an anticlinal fold, while the Blackfoot field structure in Anderson County, Texas, exemplifies anticlinal faulting. Figure 4 shows a structural map of the Talco area and Figure 5 an N-S cross-section through this same area after Wendlandt and Shelby, Jr.;[5] Figure 6 shows a cross-section through the Blackfoot field, a similar section having been published by Branson.[6]

Flowage of shale, most likely of Jackson and Vicksburg age, is believed to have formed the anticlinal folds along the "Frio-Vicksburg flexure" in South Texas. This folding is usually accompanied with strong synclinal faulting, often restricted to a single large master fault of considerable displacement; sometimes also some anticlinal faulting is present. Here the question might be raised to what extent gravity flow is involved in the rapid thickening of the Frio-Vicksburg sediments in this "flexure-zone." Does perhaps this "flexure-zone" simply mark the starting line for seaward gravity flow along a late Eocene continental slope?

2. Piercement Folds:

In the Gulf Coast area piercement folds seem to be formed exclusively by salt "intrusion." In some instances, however, shale appears to be involved in the intrusion together with the salt, the shale covering the salt like a sheath or mantle and thus becoming a part of the core of the piercement fold.

Salt domes exhibit structural characteristics which are indicative of both local uplift and local subsidence. The tendency toward a circular outline of the saltcore where it reaches closer to the surface and the presence of local angular unconformities are features which can be attributed to intrusion and uplift. The elongated, anticlinal shape of deep-seated domes, the formation of a rimsyncline (peripheral sink), the thinning of sedimentary beds over the saltcore and

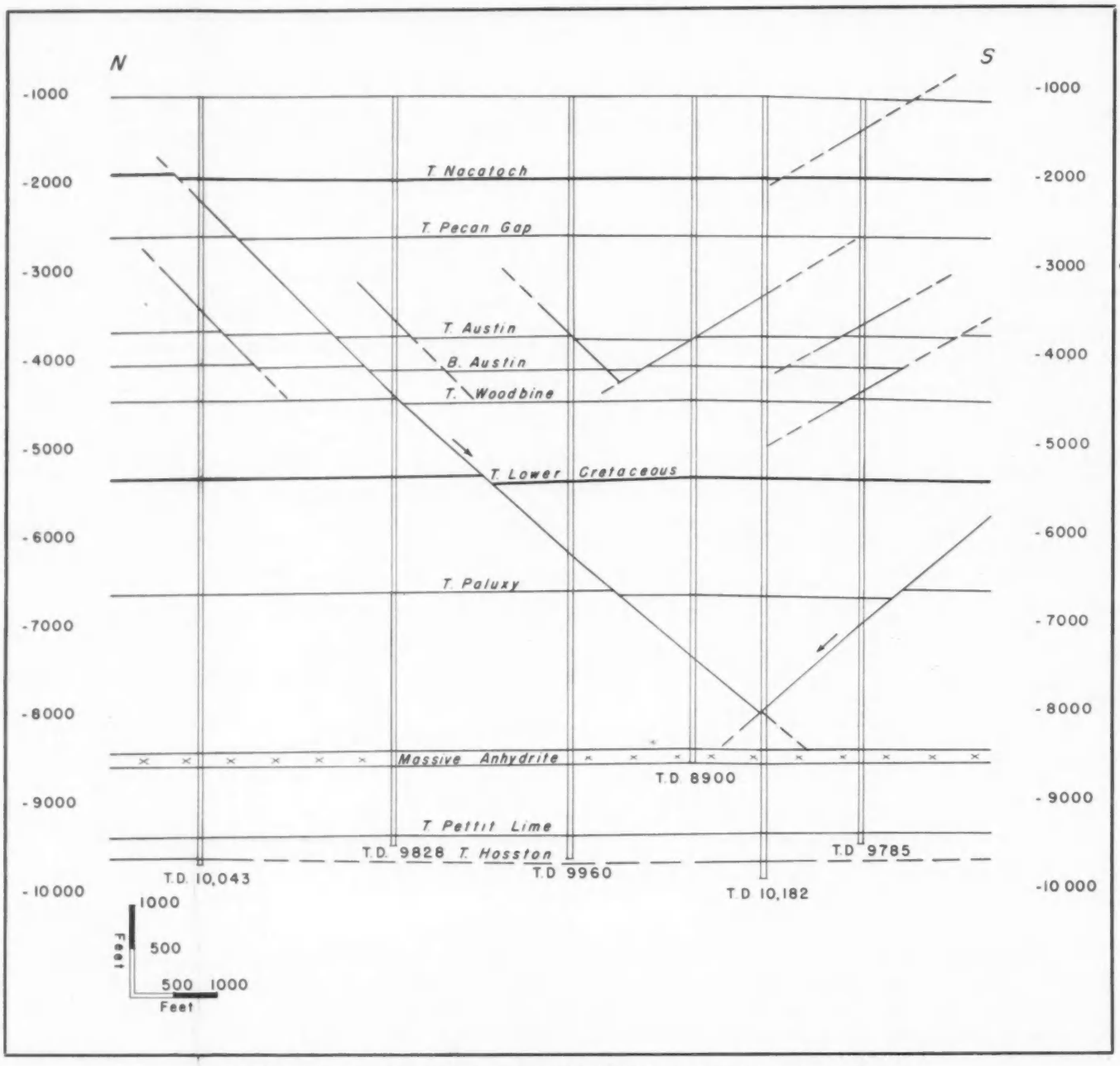


FIGURE 6—North-South cross-section of Blackfoot field located in Anderson County, Texas.

the type of faulting are all features of downbuilt, subsidence structures.

The formation of salt domes has been very satisfactorily explained and demonstrated by Nettleton's fluid mechanic theory.[7] Like the gravity flow theory, Nettleton's theory requires as a basic condition that all sediments, salt as well as surrounding sediments, behave like viscous fluids in geologic times. In addition, however, this theory requires also that salt be of lower density than the overlying beds, the difference in density providing the upward force (buoyancy force) for the vertical flow of salt and that an initial irregularity be present to "kick off" this vertical flow. The nature of this required initial irregularity is still debated by salt dome geologists and several possibilities have been suggested.[8]

Hanna[9] postulated in a paper published in 1934 that the Gulf Coast salt domes originated from deep seated salt anticlines. Since the publication of this paper, a considerable amount of new geological data has become available in support of this ostulation and the assumption that salt anticlines acted in most cases as the initial irregularity for the vertical flow of salt appears to be today the best substantiated theory geologically, also for Gulf Coast salt domes.

REFERENCES

[1] D. C. Barton, C. H. Ritz, and Maude Hickey: Gulf Coast Geosyncline, Bull. A.A.P.G. Vol. 17, 1933, pp 1446-58.

[2] Tom McGlothlin: General Geology of Mississippi, Bull. A.A.P.G. Vol. 28, 1944, pp 29-62.

[3] King Hubbert: The Strength of the Earth, Bull. A.A.P.G. Vol. 29, 1945, pp 1630-53.

[4] R. E. Rettger: Experiments on Soft Rock Deformation, Bull. A.A.P.G. Vol. 19, 1935, pp 271-92.

[5] E. A. Wendlandt and T. H. Shelby, Jr.: Talco Oil Field, Franklin and Titus Counties, Texas. Struct. Typ. Am. Oilfields, Vol. 111, 1948, pp 432-51.

[6] D. O. Branson: Blackfoot Field, Anderson County, Texas. Bull. A.A.P.G. Vol. 34, 1950, pp 1750-55.

[7] L. L. Nettleton: Fluid Mechanism of Saltdomes, Bull. A.A.P.G. Vol. 18, 1934, pp 1175-1204.

[8] Travis J. Parker and A. N. McDowell: Model Studies of Saltdome Tectonics, Bull. A.A.P.G. Vol. 39, 1955, pp 2384-2470.

[9] Marcus A. Hanna: Geology of the Gulf Coast Saltdomes; Problems of Petroleum Geology (A.A.P.G.) 1934, pp 629-78.

DESIGNERS · FABRICATORS · MACHINISTS
JOE STINE, INC.
HOUSTON, TEXAS

HYDRAULIC JACKS BUILT BY
JOE STINE, INC.

6022 Chocolate Bayou Rd.
HOUSTON 21, TEXAS
Box 14471 — Phone JA 8-0591

Specialists in custom-designed, hydraulic jacks — offshore and big-rig equipment.

*THIS TONNAGE WAS ENGINEERS' FIGURE ON RIG-WEIGHT OF SALT DOME PRODUCTION CO. RIG NO. 10.

A GULF COAST FEATURE

1 This "man from Mars" is Dick Lapp, a graduate student at Florida State University where he is part of an underwater research team. Lapp is shown in his foam-rubber diving suit (to help him keep warm), with mask and breathing device, and a camera in his right hand. Completely self-contained, without air hose or other lines, he is free to study and sample the bottom at depths up to and beyond 100 feet. At the present he limits his dives to about 60 feet of water, in line with the aims of his research group. With three other men, he is studying sedimentation processes in the quartz sand environment off the coast of Florida. His four-man team is part of a larger near-shore research group.

Pictures Continued on Page 128

Geological Students Go Underwater

With an eye on the future, Florida State University has devised a geological training program that will offer definite advantages to the operator in search of offshore production.

By WILLIAM F. TANNER
Florida State University, Tallahassee, Florida

FROM MOUNTAIN TOPS, through canyons, across plateaus, along beaches and now underwater—so is the path followed by the student and finished geologist in seeking out the mysteries of time-hidden structure patterns.

With the advent of offshore drilling, the geologic importance of marine beds has become more significant. And, several years back, staff members of major oil company geological departments went under water, seeking marine bed data pertinent to coupling surface correlation charts.

As underwater exploration plays such an important role in building foundation data for offshore oil play; and since this phase of surface investigation is so essential

Text continued on Page 130

The IX men who supervise your seismic surveys average almost 20 years experience in the business.

Experience

is the reason IX can produce better surveys

The personnel of Independent Exploration Company has packed more than 1,559 man years of experience into the company's quarter century of service to the oil industry. That's why Independent Exploration Company can offer you the tops in fast, accurate, informative geophysical surveys. Next time call in IX for a better job.

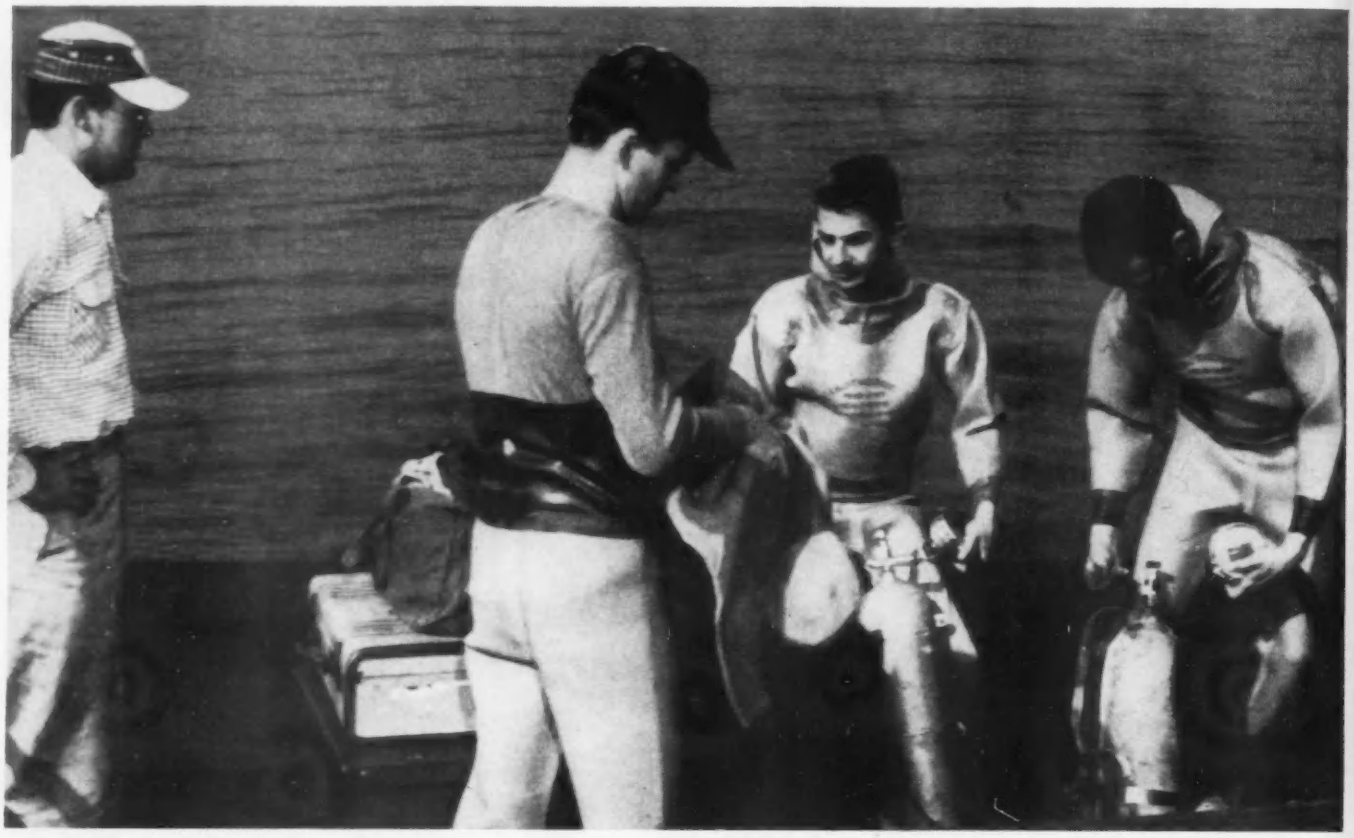
POINTING THE WAY — IXC — FOR THE DRILL

Independent Exploration Company

1973 West Gray, Houston, Texas
39 Victoria St., London, SW 1, England
208 Dominion Bank Building,
8th Ave. & 1st St. East, Calgary, Alberta, Canada

Geophysical Surveys

OVER 1,559 MAN YEARS OF EXPERIENCE



2 Suiting up for diving operations are, left to right, Dick Lapp, George Aase and Jim Vause. Watching is Bill Lapinski, deckhand for the day. All are graduate students in geology. Bill is the micropaleontologist for the group; George is mineralogist, and Dick and Jim are concerned with morphology, primary structures of sediments, ecology, and light-fraction (i.e., quartz) studies.

3 Last step before going overboard includes attaching all equipment. Dick Lapp on left has donned his mask, breathing device with compressed air supply, and weight belt. The latter is a surprise to beginners, who often do not realize that the heavy air tank is still not enough to sink a man. Lapinski is putting away nautical alidade which is used to locate near-shore diving stations. The project now operates two boats, the smaller one shown here which is on loan from the Florida Board of Conservation, and a larger one owned by the University.

OFFSHORE EXPLORATION GROUP

is pleased to announce
it has moved to new quarters at

2711 Timmons Lane
Houston, Texas

The expanded facilities of our new offices have been designed to serve you better. Management, research, maintenance, facilities for reproducing Reynolds Sections, and blueprint facilities are all concentrated here for unified service. For efficient, dependable offshore seismic surveys, call the Offshore specialists at our new number, **MA 3-5469**

OFFSHORE EXPLORATION GROUP, *2711 Timmons Lane, Houston, Texas*

4 Going overboard with depth gage on right wrist, compass on left wrist, grease pencil, celluloid sheets and clipboard for taking notes. Other equipment used on the bottom includes camera, exposure meter, centimeter stick, coring tube, and sample containers. For the latter, old soup cans are ideal; contents are transferred later to oyster cartons. Big problem is visibility; grease pencils and centimeter sticks must be chosen for maximum legibility. Diver is Jim Vause.

5 Much information is recorded on the bottom, but a great deal must be added as soon as divers surface. Dives commonly last only a few minutes, but each diver goes down with hour's supply of air. Before next dive, celluloid slate will be wiped clean for new set of notes. Much of the information will be compared with similar data from coastal plain sediments exposed in Florida, Georgia, Alabama, and other states.

to the completion of exposed structure contours, Florida State University inaugurated underwater examination of surface characteristics and "bugs" as an integral part of over-all geological study.

Although students are schooled in underwater search techniques, program aim is two-fold and neither aim is to train students to do submarine research on a professional basis. The program is geared to carry on sea floor sedimentation research programs, regardless of whether or not students are involved. And, secondly, the plan is to train students to evaluate near-shore and submarine data on the basis of personal experience.

There is slight over-lap between this program and others. Lab work is pegged almost exclusively to information gathered on the sea floor, by geologists who can examine the area in which they are working. Sea floor operations are supplemented with coring and other better known procedures. Basically, the essence of the program encompasses actual field work where the student can observe sedimentologic processes at work.

This near-shore geological research program is now in its second year at the University. Not pictured are various phases of stratigraphy and sedimentation research which are important parts of the over-all program.

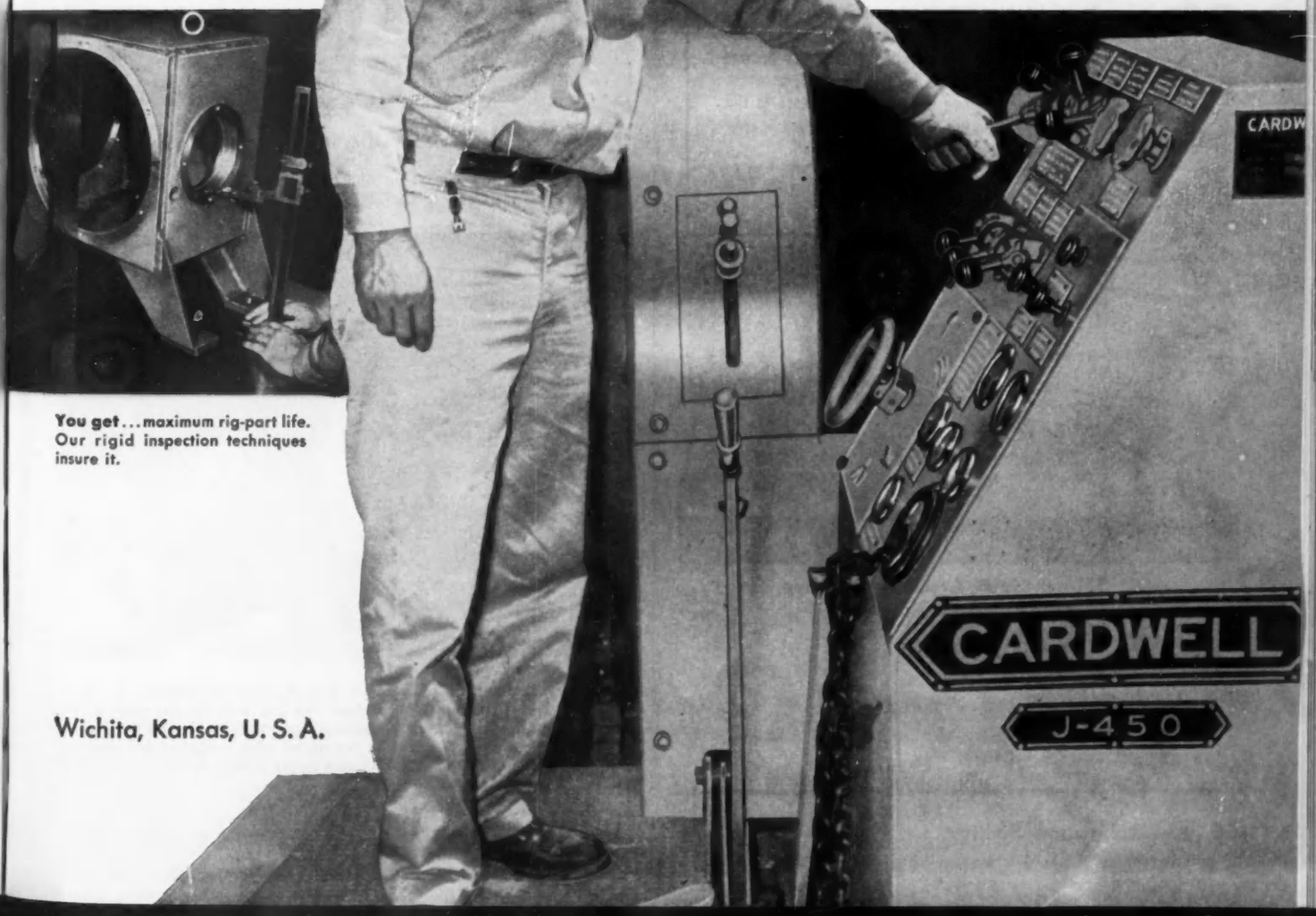
First year program funds came from a small grant awarded by the University Geology department, while second year program expansion was permitted through the granting of larger funds from the University Re-

...And Pete Westbrook, drilling superintendent for Breuer-Robison, should know! Over the past 30 years, in major Southwest and Midwest fields, he has learned to depend on Cardwell quality for higher performance ...less down time and that extra margin of reserve power that makes the big difference.

Cardwell's staff of recognized drilling specialists are at your service. For engineering and technical assistance...and field-proved quality rigs—just **CALL CARDWELL.**

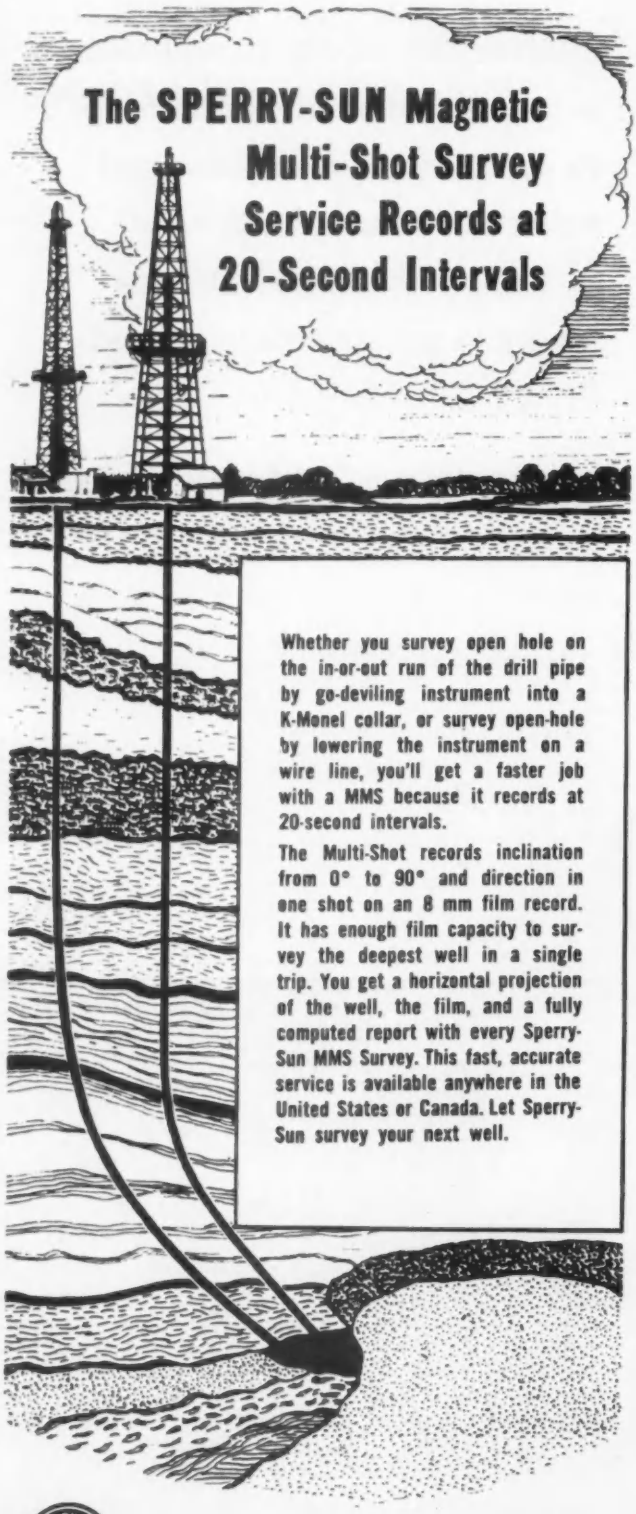
THE BEST!

RIG



You get...maximum rig-part life. Our rigid inspection techniques insure it.

Wichita, Kansas, U. S. A.


The SPERRY-SUN Magnetic
Multi-Shot Survey
Service Records at
20-Second Intervals
Whether you survey open hole on the in-or-out run of the drill pipe by go-deviling instrument into a K-Monel collar, or survey open-hole by lowering the instrument on a wire line, you'll get a faster job with a MMS because it records at 20-second intervals.
The Multi-Shot records inclination from 0° to 90° and direction in one shot on an 8 mm film record. It has enough film capacity to survey the deepest well in a single trip. You get a horizontal projection of the well, the film, and a fully computed report with every Sperry-Sun MMS Survey. This fast, accurate service is available anywhere in the United States or Canada. Let Sperry-Sun survey your next well.

SPERRY-SUN WELL SURVEYING COMPANY

3118 Blodgett Avenue Houston, Texas

BRANCH OFFICES

Corpus Christi, Odessa, Marshall, Wichita Falls, Tex. Lafayette, Westwego, La. Long Beach, Bakersfield, Ventura, Calif. Oklahoma City, Okla. Casper, Wyo.

STUDENTS GO UNDERWATER *continued*

6 Back in laboratory, Lapp weighs out a Gulf bottom sample for sieving. Lapp also is cameraman for the team. His underwater color shots bring the sea floor into the classroom for general discussion.

7 Here Lapp places loaded sieves in one of the machines, where the sand will be shaken for 10 minutes. Weights of sub-samples on the various screens give the team numerical data which can be used in additional analysis and in comparison with other sediments.

8 One of the chores connected with mechanical analysis is sieve-cleaning. Here Jim Vause does the job with a very soft brush. Sub-samples are calculated in percentages, then subjected to further statistical treatment. Results are compared with published information, and with unpublished field data compiled by other, non-diving members of the larger project.

9 George Aase uses bromoform, a very heavy liquid, to float the quartz grains, while heavier minerals are passed downward through the rubber tubes to the filter-paper-line funnels below. George will wash and then dry the heavy minerals, before mounting them for detailed study under a petrographic microscope.

10 Part of the light fraction (which is mostly quartz) goes to Bill Lapinski, who washes off the microscopic shells of foraminifera and other animals, before identifying and counting them. Comparison of the results of the diving with results from coastal plain field work should yield conclusions of value in oil industry's search for "shoreline" oil.

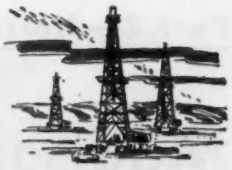
search Council and the Florida Geological Survey. A boat has been made available by the Florida Board of Conservation.

First trained in regulation swimming pools, then in quiet water sink holes, the student participating in the program is a seasoned diver prior to the initial venture offshore. The program, based on long range planning, is now preparing novice divers for participation in next year's underwater studies.

Sea floor work, beach search and field study of rocks exposed along the coastal plain—and even in the mountains—are carried on in an effort to gain better understanding of the geography of the past. There already have been indications that this multiple approach is paying-off and better results are expected in the future.

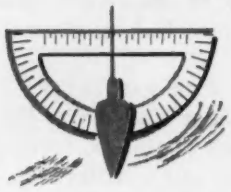
—The End

Well Surveying is our Business- OUR ONLY BUSINESS



When you want a well surveyed—up, down or sideways—call on Sperry-Sun where for 24 years we've done nothing but survey wells and develop new methods and instruments to do the job better and better. When you want a straight hole job, a cased job, or a progressive job for directional drilling we've got the men and equipment to do the job faster, better and at less expense. Sperry-Sun has 12 offices, located to serve every active area. Put your call in now for full information for the rental of an accurate, efficient instrument, or for the Sperry-Sun Service Crew.

SPERRY-SUN E-C INCLINOMETER



Measures inclination from 0°—10° for "straight hole" drilling. Available on rental plan.

SPERRY-SUN SINGLE SHOT

Measures inclination and direction from 0°—90° for surveying uncased holes or below casing by running on a line or in a K-Monel Collar. Available on rental plan.

SPERRY-SUN MAGNETIC MULTI SHOT

Measures inclination and direction from 0°—90° at any interval. Makes up to 1,000 records per run. Used for surveying uncased holes or below casing by running on a line or in a K-Monel Collar. A Sperry-Sun crew is at your service anywhere.

SPERRY-SUN SURWEL

Gyrocompass surveying of cased or uncased holes. Measures inclination and direction from 0°—60°. Makes complete record of entire hole at one trip—as many as 2000 individual readings. Sperry-Sun crew is at your service anywhere.

SPERRY-SUN OFFICES

Corpus Christi, Odessa, Marshall, Wichita Falls, Tex. Lafayette, Westwego, La. Long Beach, Bakersfield, Ventura, Calif. Oklahoma City, Okla. Casper, Wyo.

SPERRY-SUN WELL SURVEYING COMPANY

3118 Blodgett Avenue • Houston, Texas

Part 2—North Dakota's Nesson Anticline

Madison Problems Are Unusual

• Average permeabilities from core analyses give a distorted picture.

• Total production interval 200 feet . . . but net productive thickness is but 60-70 feet.

• Pressure declines below bubble-point are found in some fields.

By W. M. LAIRD and C. B. FOLSOM
North Dakota Geological Survey, Grand Forks, N.D.

THE PAY INTERVAL in the Beaver Lodge and Tioga-Madison pools occurs about 200 feet below the base of the last Charles salt. The porosity is indistinguishable to the naked eye except where vugs occur. A 30x lens is required to see the individual pores. Cores of the formation exhibit both horizontal and vertical fractures which are frequently secondarily filled. There is some doubt as to whether the fractures seen in cores are natural or induced in the coring operation. It would seem logical, however, that a thick limestone such as this would exhibit fracturing, particularly where folding or other structural movement has occurred.

The problem of the cross faulting in these fields has been mentioned previously. Evidence for it at best is indirect and it is not implied that the faults if present, have completely disrupted the continuity of the pay horizon but it would account for some of the problems that arise such as local areas of high water production, variations in water level between pools, and occurrence of dry holes where adjacent development would indicate proven locations.

Core analyses on individual wells show porosities ranging from 22.5 to 0.8 percent with averages of the order of 7 percent. Routine laboratory tests for permeability show horizontal permeabilities from 0 to 750 millidarcys with isolated measurements of 5000+. The higher permeabilities appear to coincide with intervals of vugular porosity, or fracturing.

Coring times in the pay generally drop to 10 minutes or less per foot from the normal drilling rate of 20 or more minutes per foot.

The average permeabilities taken from core analysis give a distorted picture of the existing conditions since the majority of the pay interval has horizontal permeability less than 0.01 of a millidarcy. The isolated intervals of high permeability result in averages over the length of the core, ranging from 0.6 millidarcys to 34.8 millidarcys.

In testimony before the North Dakota State Industrial Commission, a consultant from Houston computed permeabilities from 5.7 to 58.4 millidarcys in Beaver Lodge and from 116.1 to 168.9 millidarcys for Tioga, from production data. In view of the fact that actual laboratory tests indicate low permeability, the producing characteristics of the fields would suggest, rather strongly, that drainage in the reservoirs is due to fractures.

Oil saturation varies from 0 to 87.5 percent of pore space and water saturation varies from 0 to 99.5 percent of pore space. The averages of wells cored indicated saturations of the order of 9 percent for oil and 42 percent for water.

The bulk density of the pay is 2.5 with a matrix density of 2.7. Calculations of porosity based on these measurements give results very close to the averages of the laboratory analysis. From this it is concluded that the figure of 7.82 percent can be used for the porosity of the Madison pay interval in calculations of reservoir volume, without inducing serious discrepancies in the results.

In using electric logs for reservoir calculations a formation factor of 23.746 is suggested for fluid having 150 ohms per cubic centimeter and 5000 ppm NaCl or 79.296 for fluid of 4.8 ohms per cc.

Although the total interval in which production may be encountered totals 200 feet, more or less, the net productive thickness for the pools is about 60 to 70 feet.

The proven area for the Beaver Lodge and Tioga-Madison pools is considered to total 41,200 acres with 25,000 of this within the prescribed limits of the Tioga-Madison pool as presently defined. The Beaver Lodge-Madison pool is well outlined by dry holes and the Tioga-Madison pool is well defined except for the eastern boundary where some possibilities for step-out production may exist.

Although the "pay" interval appears to be continuous between Beaver Lodge and Tioga Pools, they are presently divided into separate units on the basis of a dry hole and two marginal producers which have been abandoned. In the same area, there are still a number of producing wells which are considered marginal. Water production from these wells has been noticeably greater than in the developed areas to the north and south.

In this area, there is also a structural difference of 50 feet over the mile and a half which separates production. A similar condition prevails at the southeast extremity of the Beaver Lodge field where 5 producing wells are separated from the main producing area by a dry hole and a structural difference of 40 feet in ¾ of a mile. Faulting has been suggested for these two areas and would account at least partially, for the excessive water production and generally poor quality of the wells nearby.

The possible productive area for the Charlson-Madison pool is estimated

When measuring the costs of a hole in the ground...

Price is not a wise cost comparison

"Blue Demon" Bit performance gives proven cost reduction

U.S. Patents
2,615,684 & 2,666,622 —
Others Pending

FIGURING bit cost on the price of the bit does not give a true cost comparison, since a number of variables are involved . . . rate of penetration, footage per bit, round trips required, bit service and finally bit cost per foot of hole drilled.

Hawthorne's "Blue Demon" Carbide Insert Rock Bit has become the leading all-formation drill bit in the exploration industry . . . used by more drillers than all other drag-type bits combined.

These field-proved replaceable blades, with superior inserts on the self-sharpening cutting edges, give faster, smoother penetration in hard formations . . . drilling from top to bottom without tripping between soft and hard formations.

Ample stocks of popular bit sizes are maintained in every active exploration area to give you prompt, low-cost on-the-drill bit service, and experienced field service engineers will help you with your special drilling problems.

Drill more footage faster, smoother with long-lasting "Blue Demon" Bits, and cut your cost per foot of hole.

WRITE FOR ILLUSTRATED CATALOG.

HERB J. HAWTHORNE INC.

P. O. BOX 7366, HOUSTON 8, TEXAS

6150

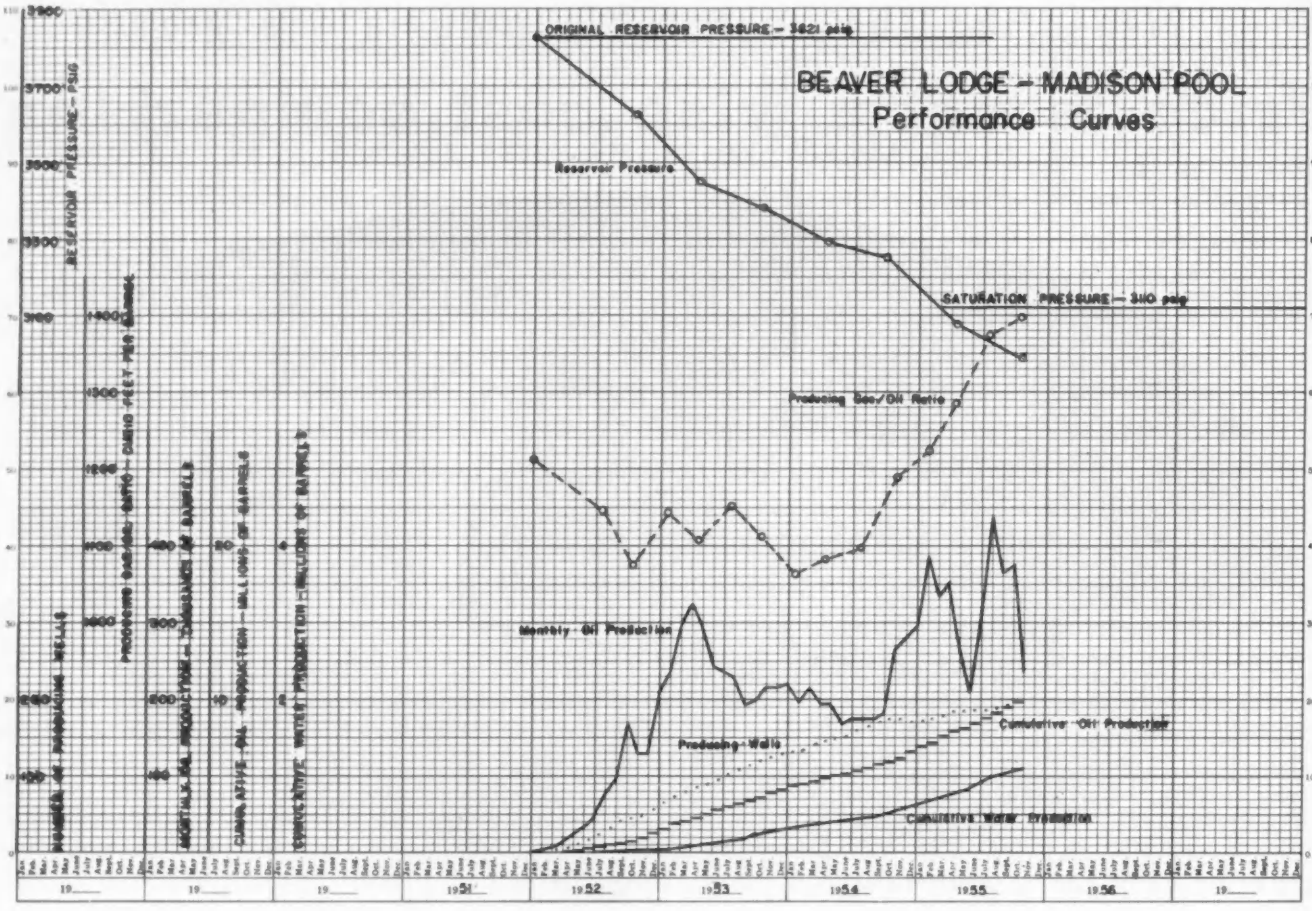


FIGURE 4—Performance curve for Beaver Lodge–Madison Pool.

to be 13,000 acres; for the Capa-Madison pool, 5500; and for the Hofflund-Madison pool 6000 acres. No estimates have been made of the productive area in the Blue Buttes, Croff, and Keene fields due to the lack of development.

In the Charlson-Madison pool, the "pay" interval, as identified by geologists of the North Dakota Geological Survey, reaches a thickness of about 130 feet over the top of the structure. This "pay" interval is an identifiable interval on the mechanical logs and includes both porous and non-porous intervals. From core analysis, the net productive thickness, in the well cored, is probably limited to 35 feet with the total "pay" thinning on the flanks of the structure.

The oil water contact is placed at 6500 feet below the sea level in the Charlson-Madison pool, which results in a maximum oil column of 122 feet for this pool. The water contact is placed at —6260 in the Capa-Madison pool with a maximum oil column of 70 feet; —6155 feet in the Beaver Lodge-Madison pool with a maximum oil column of 138 feet; and —5925 feet in the Tioga-Madison with a maximum oil column of 239 feet. In each case the maximum oil column exceeds the closure.

The oil from the Madison reservoir at Tioga is undersaturated, of low molecular weight, containing 1585 cubic feet of solution gas per barrel of residual oil. The gravity is 44° at 60° F. Reservoir temperature is 212° F. in Tioga and the viscosity was 0.169 centipoises at saturation pressure of 3049 psig. The Beaver Lodge-Madison reservoir had a solution gas-oil ratio of 1773 and viscosity of 0.147 centipoises at saturation pressure of 3205 psig. The gravity of the oil is 43° API at 60° and the reservoir temperature is 224° F. The relative volume factors for the Beaver Lodge and Tioga-Madison reservoirs were 2.135 and 1.983, respectively, at Saturation pressure.

Evaluation data on the produced oil from these fields showed a total sulfur content of 0.34 percent and a Reid vapor pressure of 7.4 pounds. The pour point is 35° F. with 3.5 pounds of salt per 1000 barrels. The Kinematic viscosity was 2.135 centistokes at 100° F. Podbielniak analysis showed 92.4, liquid volume percent, Hexanes or heavier with a specific gravity of 0.8309 and a viscosity, at 100° F. of 2.641 centistokes.

The characteristics of the reservoir fluid from the other Madison pools on the anticline are similar. Solution gas-oil ratios are 1598, 1651, and 1952 in Charlson, Hofflund, and Capa fields, respectively.

It is interesting to note the increase in the API gravity of the oil which occurs up dip to the north. Readings for the fields, beginning with the furthest south, are Croff—41.9, Blue Buttes—40.7, Keene—41.5, Charlson—41.6, Hofflund—42.8, Capa—43.4, Beaver Lodge—43.0, and Tioga—44.

Reservoir temperatures are Croff—231°, Blue Buttes—238°, Charlson—224°, Hofflund—228°, and Capa 226° F. The viscosity of the oil is 0.132 cps. at Capa. Relative volume factors are 2.064 for Charlson, 2.083 for Hofflund, and 2.261 for the Capa field, at saturation pressure of 3211 psi, 3085 psi, and 3302 psi respectively.

The reported GOR for the Clarence Iverson well in the Madison pool

32,824 ton miles with one Tiger Brand Rope"

"According to ton-mile records, we've never had a better rope than Tiger Brand,"

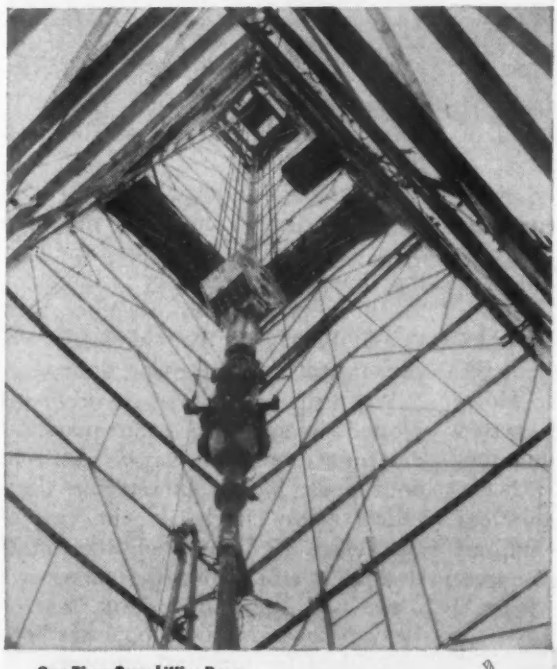
says Mr. W. C. Williams, Tool Pusher for Norton Drilling Company, New Orleans, La.

The Norton Drilling Company Rig No. 5 is an inland marine barge of the split-hull type designed for shallow water. It was drilling about 30 miles south of New Orleans when these photographs were taken.

The rig was equipped with a 2,500-foot Tiger Brand 1¼", 6 x 19, IWRC drilling line. This had been in service about eight months drilling 68,277 feet of hole for a total of 32,824 ton miles. The rope had been cut back at the drum regularly in the course of service . . . a practice which paid off in longer rope life and lower costs.

Norton Drilling Company keeps accurate ton-mile records which they consider to be the best method for judging the life of wire rope. That's why they used Tiger Brand on this important barge rig where any shut-downs would be extremely expensive.

Why not prove it to yourself? Send the coupon for one of our free Ton-Mile Calculators. Then rig up with Tiger Brand and check its performance *on your own rig*. We're sure you'll be back for more Tiger Brand Line.



One Tiger Brand Wire Rope drilled five wells averaging about 10,000 feet each and there was still plenty of service left in it.

AMERICAN STEEL & WIRE
DIVISION
UNITED STATES STEEL, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

MAIL THIS COUPON

American Steel & Wire
Room Q-66, Rockefeller Building
Cleveland 13, Ohio

☐ **Rush me one free Tiger Brand Ton-Mile Calculator.**

☐ **Have your representative call to show me how this calculator can help me cut line costs.**

Name .....

Firm .....

Address .....

City & State .....

USS AMERICAN TIGER BRAND WIRE ROPE

USS — *Excellay Preformed*

UNITED STATES STEEL

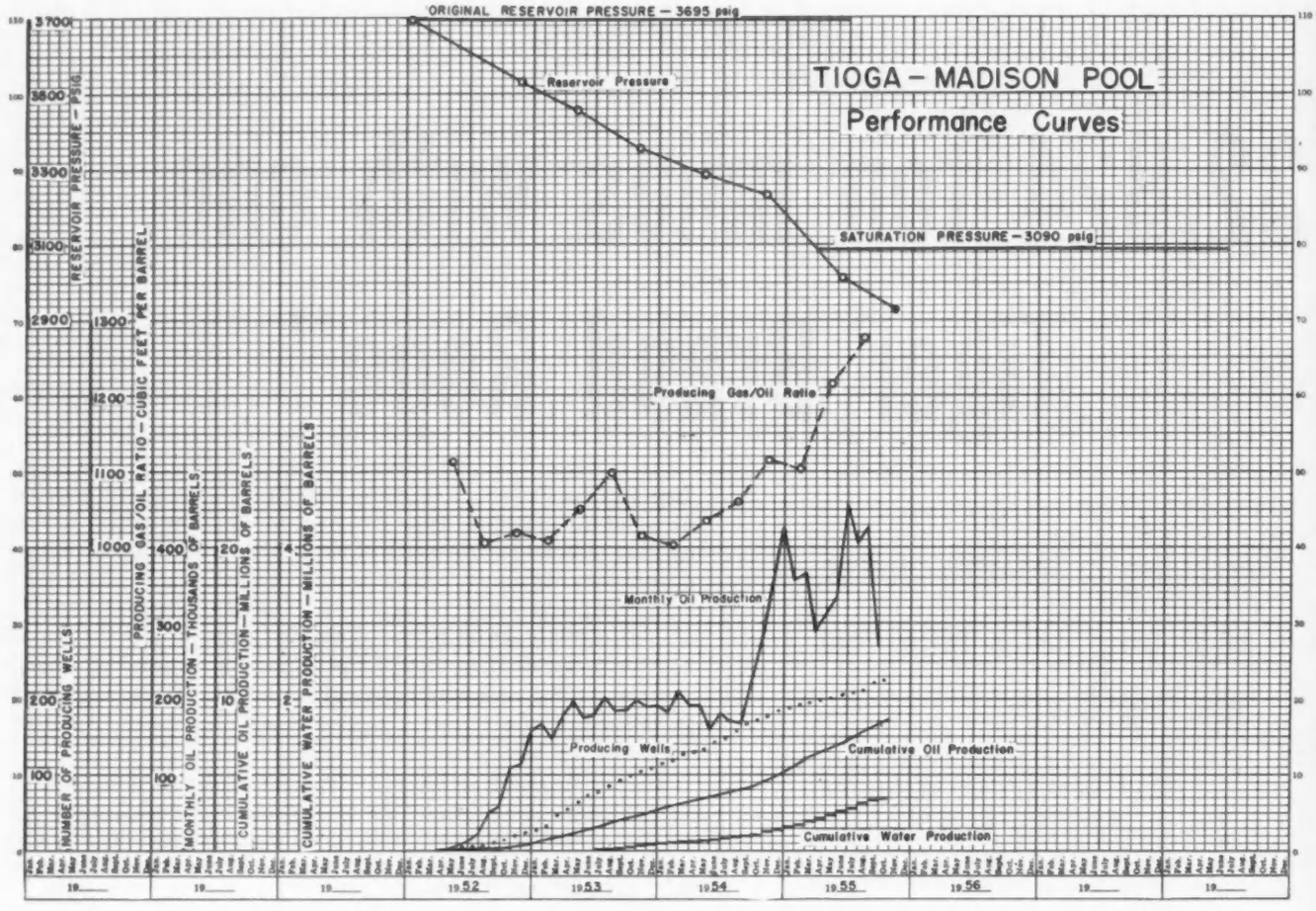


FIGURE 5—Performance curve for the Tioga–Madison Pool.

in Beaver Lodge was 1211 cubic feet per barrel, initially. The average gas-oil ratio for the field was varied, reaching a low of 1062 in the first quarter of 1954. Since that time, it has increased steadily to its present average value of 1374 cubic per barrel. (See Figure 4).

In the Tioga field, the initial GOR for the discovery well was 1094 cubic feet per barrel. The lowest ratio, 1001 cubic feet per barrel was reached during early 1954 and the present average value of 1273 cubic feet per barrel represents a steady rise. (See Figure 5).

Both pools have now declined in pressure below bubble point. Saturation pressure was passed during the first half of 1955 for both fields. Present average bottom-hole pressures are 3079 psig and 3015 psig for the Beaver Lodge and Tioga pools, representing declines of 616 and 646 psi, respectively.

The pressures in the two pools have declined similarly. The decline had been following a uniform curve until January, 1955. Since that time, both decline curves have broken sharply, still moving parallel, and have dropped below saturation pressure. This break coincides with the increase in production, from 355,000 barrels per month to 800,000 barrels per month, that occurred when the market demand increased at the end of 1954.

Some consideration has been given to the possibility that this interrelation between production rate and pressure reaction indicates the approximate MER in each case. On this basis it would appear that production should be stabilized at about the rate prevailing during 1953. However, a different idea is suggested when actual declines are compared to the theoretical curves for the fields.

Simple mathematical equations which would represent the natural relationship between reservoir pressure and time are as follows:

- Beaver Lodge-Madison pool
  $\log P = 3.58218 - 0.00240\ t$
- Tioga-Madison pool
  $\log P = 3.56761 - 0.00226\ t$

Where P is reservoir pressure in psig and theis time in months.

It can be seen that the two curves are very similar. The pressures used are corrected to the datums for each pool:—6100 for Beaver Lodge and —5850 for Tioga. If the pressures for the Beaver Lodge curve are corrected to the Tioga datum, there remains a difference of about 50 psi between the curves.

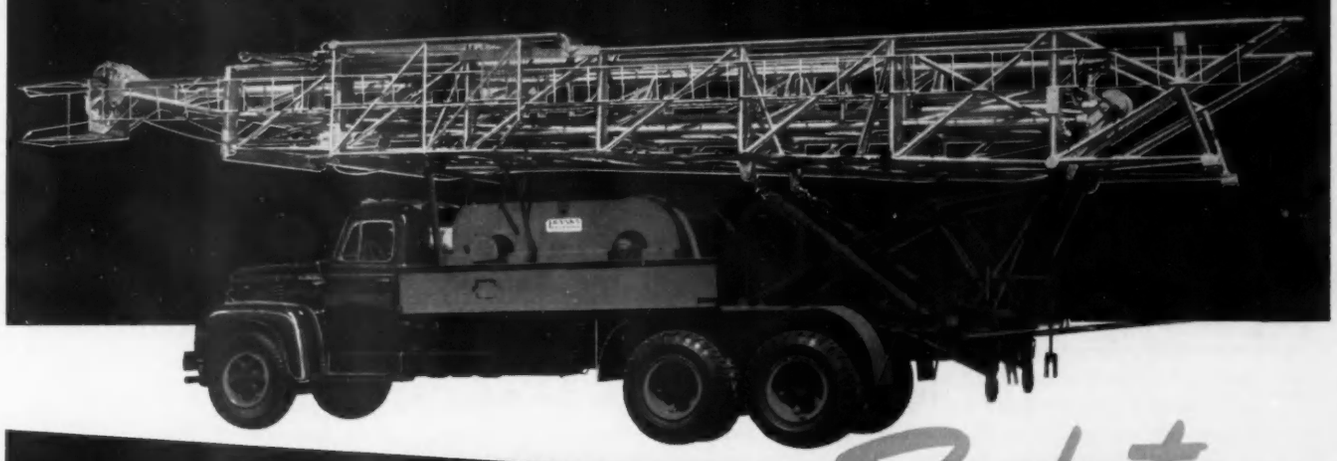
This would indicate that the two pools are not connected, although their performance is similar, and that the drainage mechanism is the same for both pools. This, together with the GOR behavior, would suggest the presence of depletion-type drainage.

When the actual pressure decline is plotted against the mathematically determined curve, it can be seen that both pools have followed the theoretical curve closely. In the case of the Tioga-Madison pool, the actual decline is still above the theoretical curve and the actual curve for the Beaver Lodge-Madison pool has been coincident for practical purposes. On the basis of these curves, it appears that the MER for the two pools is about equal to the current withdrawals at this writing.

At the beginning of the second quarter of 1955, the average of the productivity indices of individual

move FASTER

. . . AND GET ON PAYING JOBS FASTER



with a FRANKS Rocket

1. Because . . .

Franks Rockets make faster location-to-location moving, strung up. With this, plus faster rig-up and down (no guying to ground required), contractors get on paying jobs faster with Rockets.

2. Because . . .

Franks Rockets using air lift rod transfer actually pull rods and tubing faster and protect rods from excessive wear and tear.

3. Because . . .

superintendents request their use and consequently Franks units spend less idle time in yards.

IT WILL PAY YOU TO CHECK FRANKS ROCKETS BEFORE YOU BUY

FRANKS
DIVISION CABOT SHOPS INC
WELL SERVICING AND DRILLING UNITS
TULSA, OKLAHOMA

"ON THE SPOT" FIELD SERVICE

Only Franks offers "on the spot" field service with stock of parts and factory-trained personnel at: Alice, Compton, Casper, Farmington, Great Bend, Houston, Kilgore, Odessa, Seminole, Edmonton and Tulsa.

FRANKS DIVISION
Cabot Shops, Inc.
Box 3218, Whittier Station
TULSA, OKLAHOMA

CABOT SHOPS, INC.

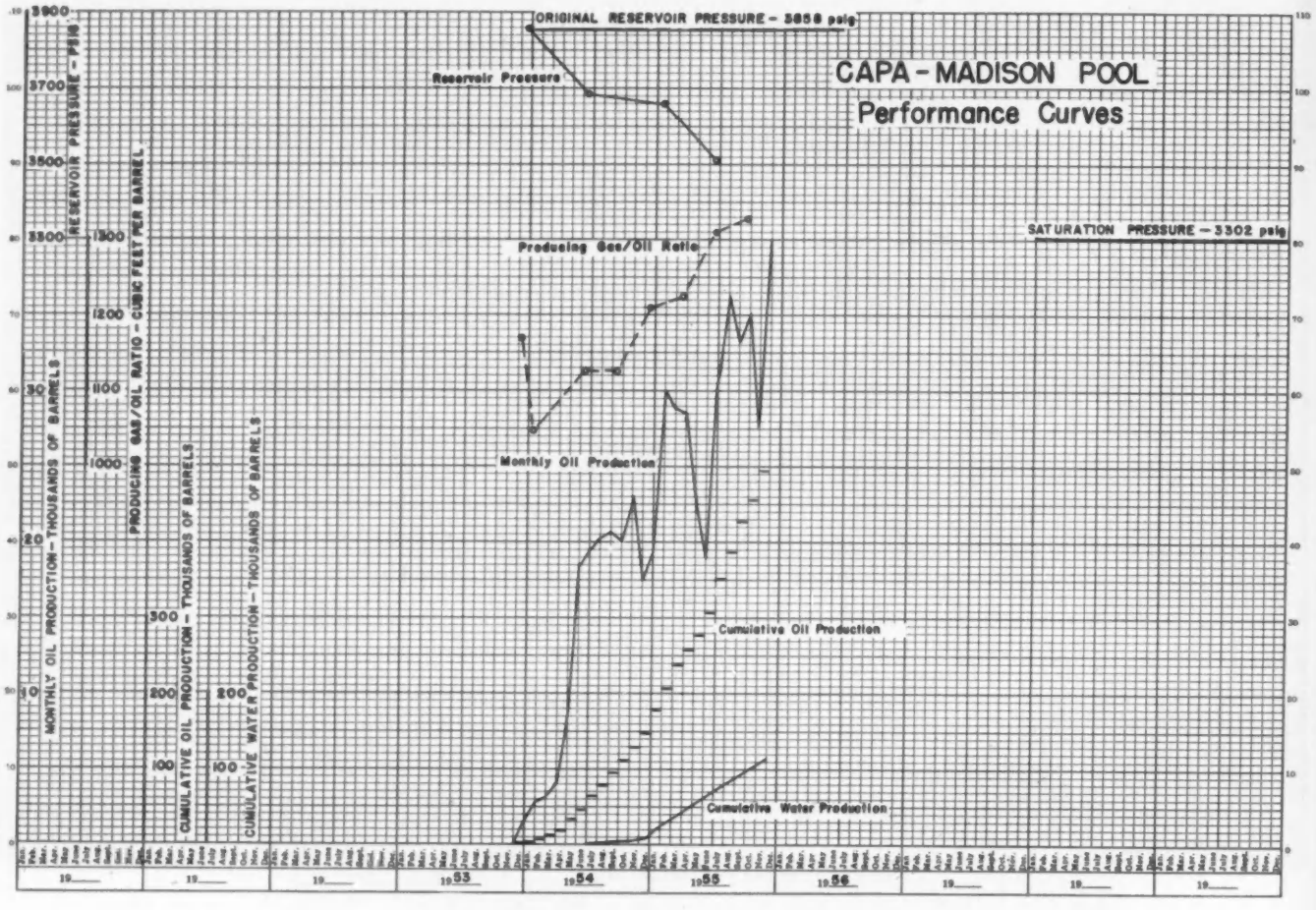


FIGURE 6—Performance curve for the Capa-Madison Pool.

wells in the Beaver Lodge and Tioga-Madison pools were 122.27 barrels of oil/psi, pressure drop, and 90.95 barrels of oil/psi respectively. The distribution of the indices is shown in Table 1.

TABLE 1
Productivity Index—Bbls/psi
Number of Wells in Each Group

PI	Beaver Lodge	Tioga
0- 50	14	13
50-100	51	105
100-150	71	26
150-200	18	7
200	4	4
Total	158	155

From the table it can be seen that Tioga appears to be the more uniform of the two pools. Whereas more than ⅔ of the wells checked in the Tioga-Madison pool had indices between 50 and 100, only ⅓ of the wells in the Beaver Lodge-Madison pool fell within this range with an additional 45 percent having indices between 100 and 150 barrels of oil per psi. The ranges of productivity index encountered were from 15 to 536 barrels of oil per psi for Beaver Lodge-Madison and from 16 to 388 barrels of oil per psi for the Tioga-Madison pool.

The original gas-oil ratios for the other Madison pools were: Croff 1501 cubic feet per barrel, Blue Buttes 1020 cubic feet per barrel, Keene 1296 cubic feet per barrel, Charlson 949 cubic feet per barrel, Hofflund 1570 cubic feet per barrel, and Capa 1167 cubic feet per barrel. (See Figures 6, 7, and 8). Although some variations have occurred between successive measurements, the present gas-oil ratios are between 1150 and 1350 cubic feet per barrel, in these fields.

Estimated recoverable reserves of crude oil for the Beaver Lodge and Tioga-Madison pools are 95 and 150 million barrels, respectively, as of October 1, 1955.

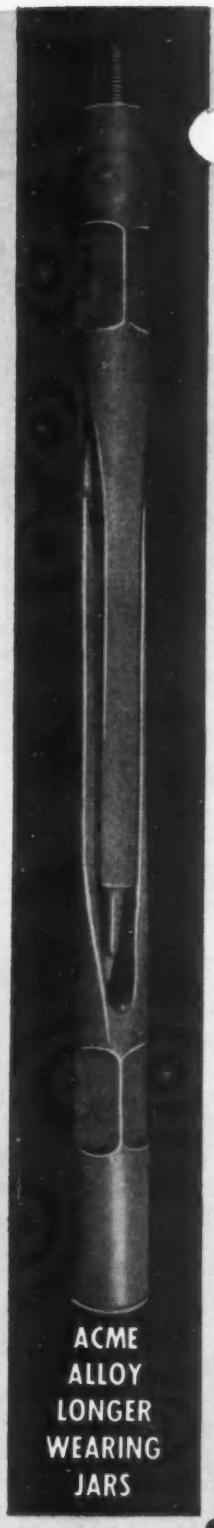
Total recoverable wet gas, available, for sale, after processing at the Signal Oil & Gas Company's Tioga plant is estimated to be 265 billion cubic feet from the two reservoirs. The deliverability of these reserves is important and it should be recognized that the amount of gas available on any day will be dependent upon the market demand for crude oil and the MER of these pools since the production of oil will be regulated by these two factors.

In a conflict of interest between the consumers of the natural gas and the responsibility of the state to prevent waste of oil, the state will exercise its police power to regulate the oil production.

In attempting to compare these estimates of reserves with earlier, similar, estimates, it should be remembered that the boundaries of the two pools were changed by the State Industrial Commission in its orders of October 29, 1955.

Reserves have been estimated for the Charlson, Hofflund, and Capa-Madison pools at 45 million, 20 million, and 35 million barrels respectively.

Operators seeking to establish production in the fields of the Nesson anticline are faced with a number of unusual problems not ordinarily encountered elsewhere. Since the Madison limestone reservoir lies directly beneath the Charles formation, all wells must penetrate 200 to 400 feet of crystalline salt section. The early



ACME ALLOY LONGER WEARING JARS

"are YOU getting ENOUGH FOOTAGE?"

1. To MAKE MORE MONEY you have to get a higher price for your drilling, or get more drilling from your machine and tools. The progressive drilling contractor is always after both—more money and more footage.

2. To get you MORE FOOTAGE, Acme spent more than a decade developing a superior alloy jar. How? By the same quality methods that have made the Acme Carbon Jar victorious over all competition. Today over 85% of the carbon jars made in America are Acme and they wear as long as a competing weldless jar in many sizes.

3. To get LONGER WEAR — much longer wear — in all formations, the Acme alloy jar has been perfected. Look up the word Acme in your dictionary; it comes from the Greek word, Akme, meaning perfection, peak of progress. Here is how we live up to our great name.

4. We have installed the MOST MODERN EQUIPMENT to manufacture jars. Exclusive with Acme are the latest technological improvements in the physical treatment and welding of jar steel. No one else offers you the benefit of such superior manufacturing facilities. Acme Alloy Jars — like Acme Carbon Jars — are superior because they are made by superior methods and machinery.

5. We use SUPERIOR STEEL in Acme Alloy Jars. It is a triple strength alloy steel, grade AISI 4340 made out of chromium, molybdenum, and nickel. It is a longer wearing alloy steel than the single alloy used in a competing make. Acme Alloy Jars have 1300% more alloy in them than any other make on the market.We use a chrome-moly-nickel steel which is rich in nickel, producing a greater depth of hardness penetration than the single alloy used by a competing make. LONGER WEAR is the bonus you get from the superior alloy steel in Acme Alloy Jars.

6. We use ATOMIC AGE WELDING methods. The welding techniques of today permit use of alloy steels far superior to those used at the time weldless jars were first made. The atomic age has made the weldless method obsolete. We put one electric weld in a set of Acme Alloy Jars. It is stronger than steel. The weld is X-rayed by an electro-magnetic process so that no bad welds can get past inspection. This one weld is in the crotch where the steel is 50% heavier than in the rein section. Both sections of the jars are drop forged. This method of making alloy jars enables Acme to use a superior alloy steel, and you get a superior alloy jar with less breakage and longer wear.

7. Acme, like its parent company, Stardrill-Keystone, has a basic policy of QUALITY FIRST. While another manufacturer of alloy jars uses an alloy steel containing only ⅛ of 1% alloy content, Acme, in its alloy jars, uses a steel containing 3% of alloy — or 1300% more.

8. Acme gives you MORE STEEL. For example our 5½" Acme Alloy Jars weigh 425 lbs. . . . 10% more than a competing make. At the same price.

SINCE 1900 **IN OUR 56TH YEAR**

VICTORIOUS JARS

ACME ALLOY JARS made of MOLYBDENUM CHROMIUM NICKEL Alloy Steel

ALLOY

3¼" Dia. $244.00	
3⅝" Dia. $244.00	
4⅛" Dia. $271.00	
4¾" Dia. $293.00	
5½" Dia. $330.00	
6¼" Dia. $534.00	
6½" Dia. $560.00	
7" Dia. $690.00	

Fig. 107AA

CARBON

2⅝" Dia. $154.00	
3¼" Dia. $165.00	
3⅝" Dia. $176.00	
4⅛" Dia. $187.00	
4¾" Dia. $209.00	
5½" Dia. $236.50	
6½" Dia. $500.00	
7" Dia. $600.00	

Fig. 107

And every Fishing Jar Size at the Best Price.

Every Fishing Jar size as well as every Drilling Jar size.
Acme Carbon Jars 6½" Dia. and larger sizes are made to heavy construction, similar to Acme Alloy Rein Type Jars, Fig. 107AA.
Acme Alloy Jars have more wearing stock than any other make.
All prices F.O.B. Factory, Parkersburg, W. Va.

Place your orders through your supply store or Dealer

PESA — Petroleum Equipment Suppliers Association — Partners in Petroleum Progress

Complete information on Jars and other Acme Drilling and Fishing Tools is available in a FREE CATALOGUE. For your Copy, consult your nearest ACME DEALER or write direct to:

Acme Fishing Tool Company
PARKERSBURG, W. VA.
ESTABLISHED 1900
Greatest Name in Cable Tools
Tool Plant Division: STARDRILL-KEYSTONE
EXPORT OFFICE Stardrill-Keystone Co., Beaver Falls, Pa.

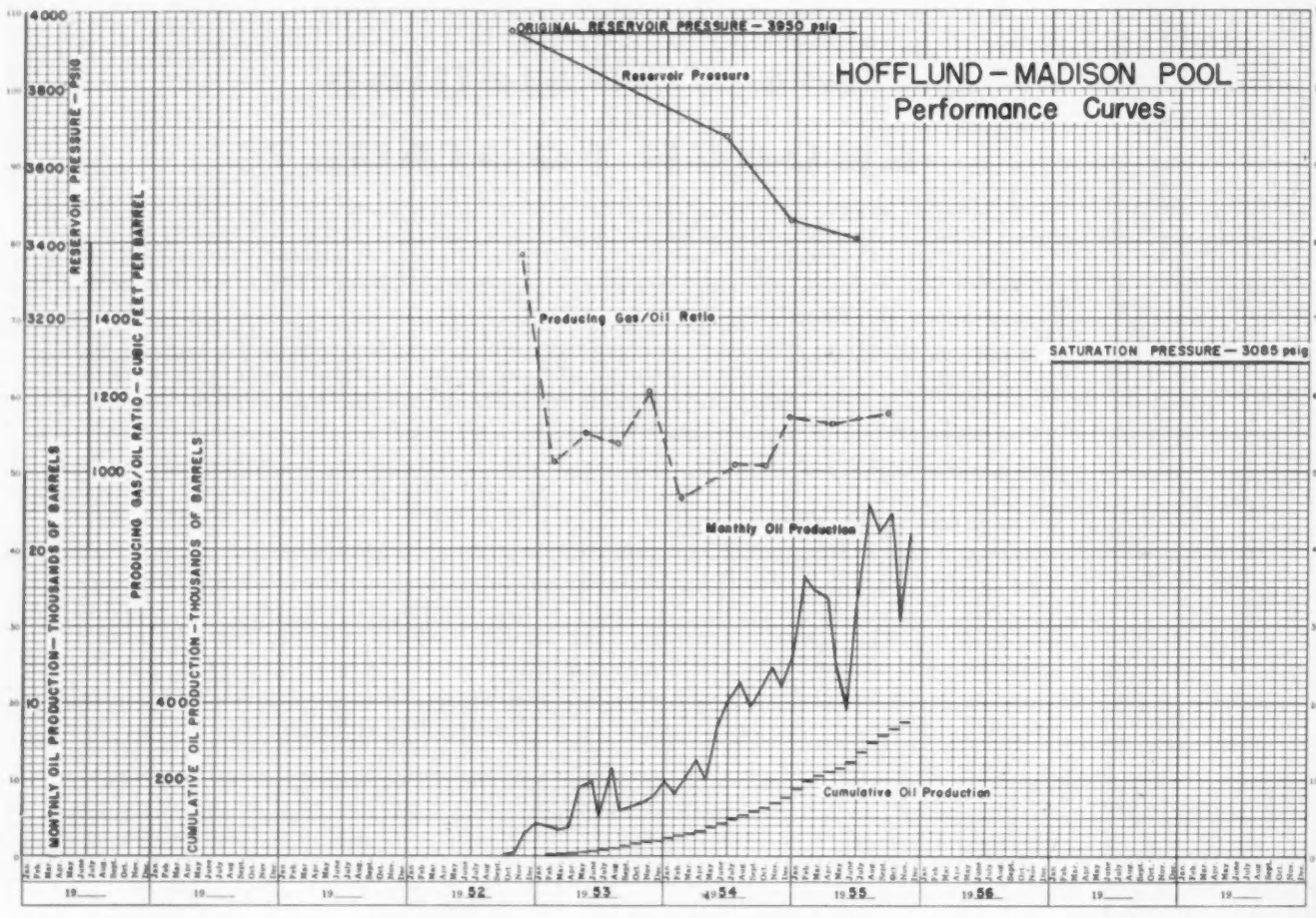


FIGURE 7—Performance curve for the Hofflund–Madison Pool.

drilling programs called for a production string of 5½-inch OD casing, made up of 15.5 and 17 pound seamless casing.

Casing was set at 10,823 feet in the Palmer Dilland well in April, 1952. In June, 1954, it was necessary to kill the well, and move in a workover rig due to loss of production. It was found that the casing had collapsed opposite the salt section and had partially flattened the tubing. Similar circumstances were found in other wells throughout the fields. Although the exact reason for this failure has not been clearly established, it is thought that plastic deformation and subsequent movement of the salt is responsible.

In an attempt to eliminate this trouble, salt base mud is now used when drilling this section. The use of this type mud should result in holes of uniform gage. Recent wells have been cased with 7-inch OD 23 pound-32 pound-35 pound N-80 casing as a further precautionary measure.

Due to the increased use of salt base mud, most of the salt water from production was utilized and its disposal was not a problem. With development nearly completed, thought is being given to the establishment of a down-hole disposal system. One of the larger operators has already laid a system of concrete pipe for the gathering and transportation of this water to disposal wells. It will be injected into the Lakota formation of Cretaceous age through dry holes and previously abandoned producers on the edges of the fields.

The weather constitutes another difficulty of considerable proportions. The heavy snowfall and the drifting which occurs require a great deal of maintenance work on roads, lease equipment, and vehicles. Since the pour point is only a little above the normal winter temperatures, difficulty is experienced in the maintenance of piping and valves.

Drilling operations are continued through the winter at a somewhat reduced rate. Rigs are winterized and steam generating equipment is used for heating the rig and thawing lines, pits, etc. Some hazards exist, due to the weather, which would not ordinarily be encountered. One of these is the possibility of fire when taking drill stem tests, due to the enclosure of the rig floor, such as occurred on a Penrod rig in Tioga field during the winter of 1954-55.

It is estimated that the annual cost of maintaining production in these fields is about $10,000 per well; most of it as a result of the rigorous climate.

North Dakota is now faced with a rather unusual problem for an inland state, namely offshore drilling. The completion of the Garrison reservoir will result in the flooding of much, possibly productive land. Three methods of developing the flooded area were considered. These were drilling barges, earthen mounds, and directional drilling. The use of drilling platforms or barges was discarded because of expense and the danger of severe damage from ice.

One well already completed in the flood-plain was raised on an earthen mound to bring the wellhead above the high water level. The mound is approximately 41 feet high with a 600-foot causeway to the shoreline. The mound measures 60 x 80 feet at the water line and the roadway is 30

New Engines Added
to General Motors 2-cycle Diesel Line

Detroit Diesel Turbopower

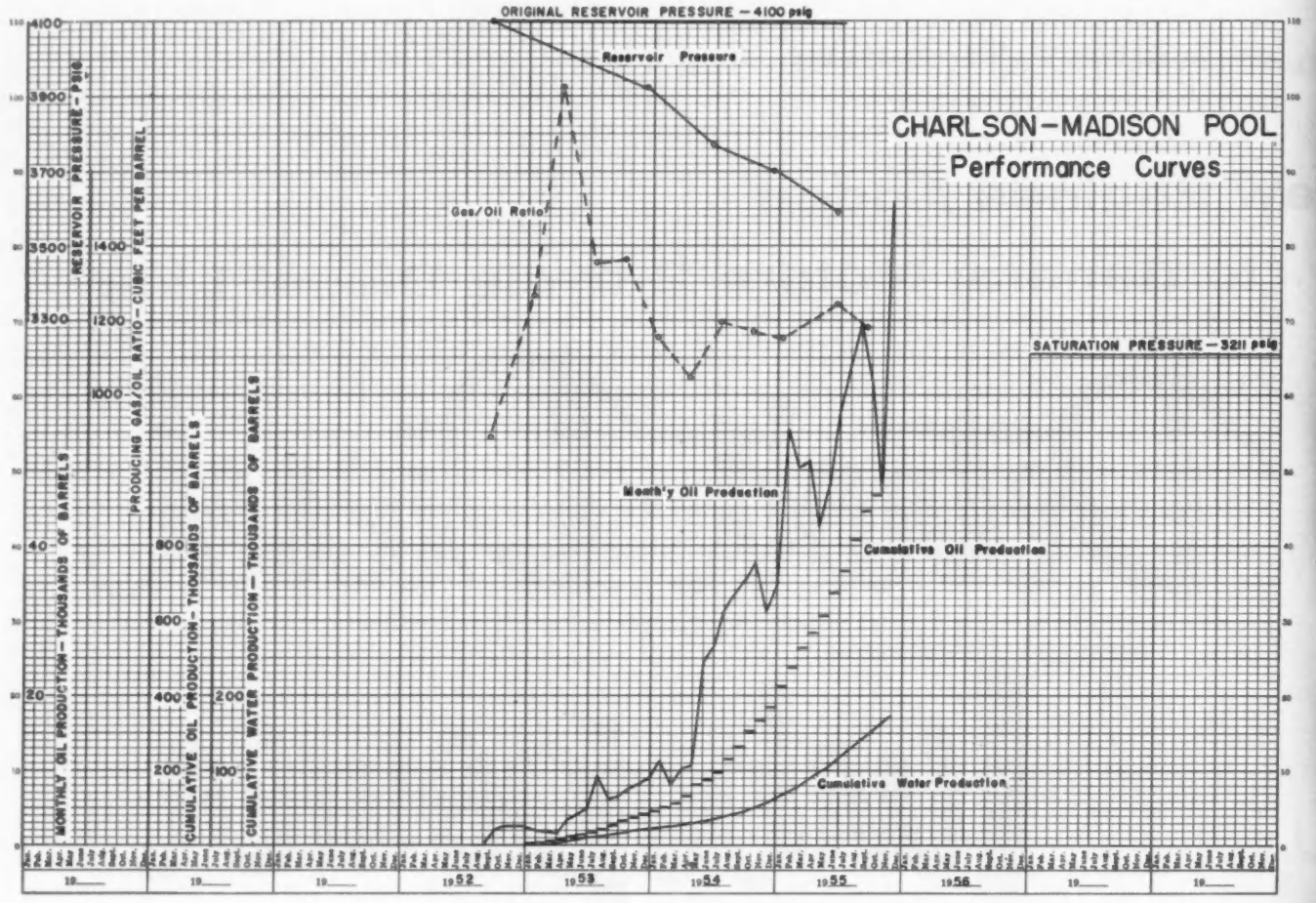


FIGURE 8—Performance Curve for the Charlson-Madison Pool.

feet wide. Side slopes are 2 to 1, covered with a 12-inch gravel filter and 18 inches of riprap. The top of the structure is finished with 3 inches of gravel and native 'scoria.' In the causeway fill is buried a 4-inch, welded, gathering line. The cost of the structure was approximately $65,000.

Directional drilling was deemed to be the most satisfactory method of reaching the underwater area and on 24 June 1954, Amerada Petroleum Corporation spudded its J. G. Viall Tract 1 No. 1 on the north bank of the reservoir. The well was deviated 1893 feet to the southeast and was completed in 63 days at a cost of about $215,000. The drilling proceeded without incident and the well was completed in the prescribed location. Although directional drilling is not a new technique in the oil industry, this was the first attempt to carry out such an operation in an area of well indurated rocks.

On July 7, 1955, a second directional well was spudded on the south bluff. It soon became apparent that the directional surveys were not accurate and the well was plugged back from 7768 to 3555 feet where drilling was resumed. It is thought that the difficulty arose from the use of a single, 18 foot, K-monel drilling collar. After plugging back, two collars, totaling about 30 feet, were run and the source of the difficulty appears to have been eliminated.

To date, the directional drilling has been limited to locations within 2000 feet of the drilling site. In this distance drift angles are kept at less than 25°. To reach more distant locations, much lower angles would be necessary.

Paraffin in the production becomes a serious problem when withdrawal rates are curtailed. In order to reduce maintenance costs, the operators are allowed to produce their monthly allowable in as little as 5 days. The rule limits production rates to 600 percent of the daily allowable, but the total allowable for any month shall not be exceeded.

Proration to market demand is in effect by virtue of a statute enacted by the 1953 legislature. The market demand is allocated among the pools, and the wells in the pools, so as to distribute the market on an equitable basis. A proration unit is a 40-acre tract of land and a normal unit allowable is set each month for a proration unit. This normal unit allowable is then adjusted for depth and gas-oil ratio in setting the final daily allowable. When more than one proration unit is incorporated in a drilling unit the allowable for the well on that drilling unit is increased proportionately.

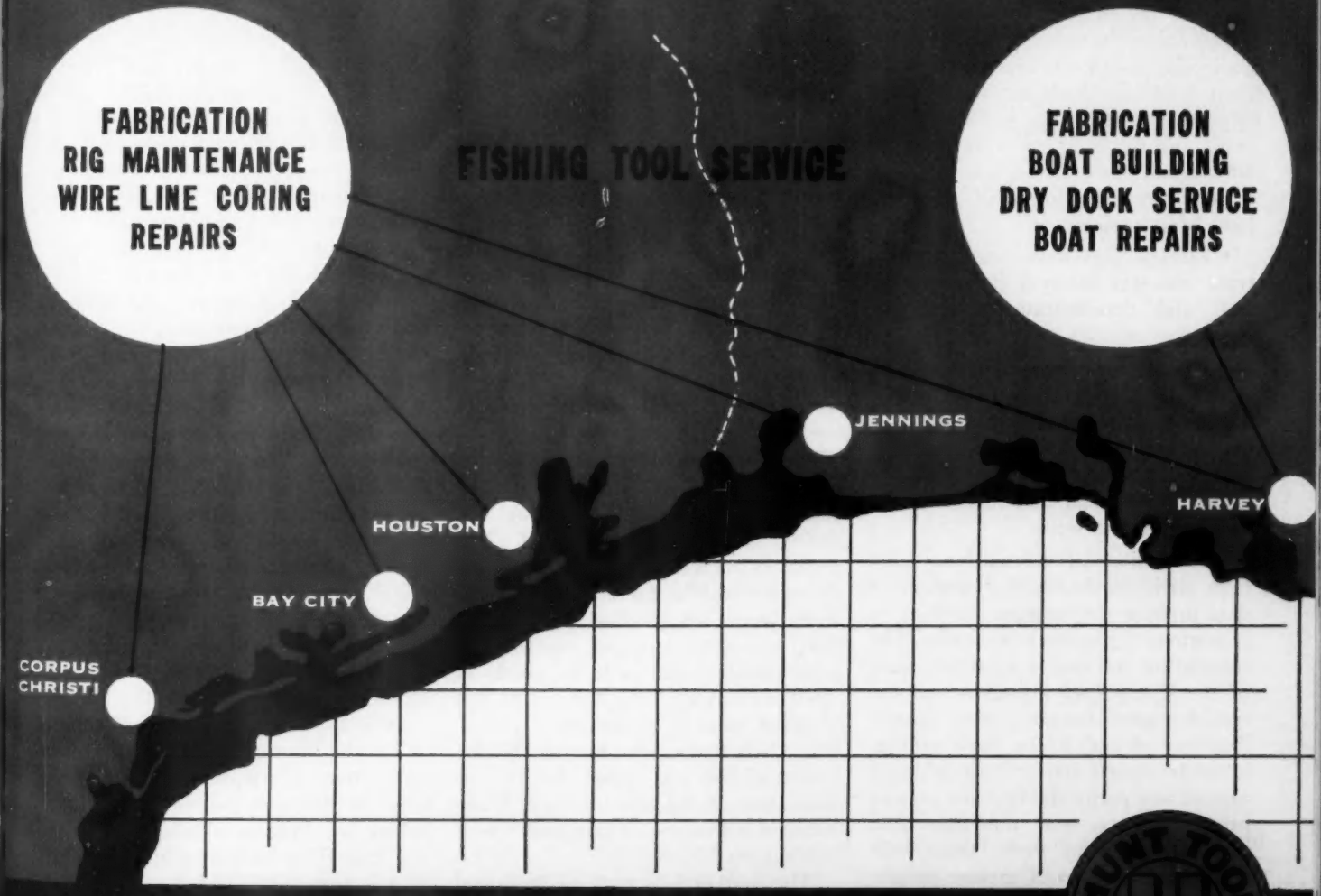
In setting spacing patterns for the development of these fields, the Industrial Commission has followed the principle of setting wide spacing for initial development, in order to establish more quickly the limits of the pool and obtain data on the reservoir. A final proper spacing is determined when sufficient data has accumulated to form a basis for a sound determination.

By tying the proration to tracts of land rather than wells, and thus increasing the allowable for wide spacing, the effect of spacing changes on the income of land owners and royalty

From Corpus Christi to New Orleans

HUNT TOOL COMPANY

COVERS GULF COAST OFFSHORE OPERATIONS



HUNT TOOL COMPANY

GENERAL OFFICES AND PLANT: HOUSTON, TEXAS
FIELD SHOPS: BAY CITY & CORPUS CHRISTI, TEXAS; JENNINGS & HARVEY, LA.
MARINE DIVISION: HARVEY, LA.
EXPORT SALES: HUNT EXPORT COMPANY, 19 RECTOR ST., NEW YORK
HOUSTON, TEXAS; BUENOS AIRES; PORT OF SPAIN; CARACAS

HUNT TOOL COMPANY

FISHING TOOL SERVICE

A BUSINESS BUILT ON *Good* SERVICE

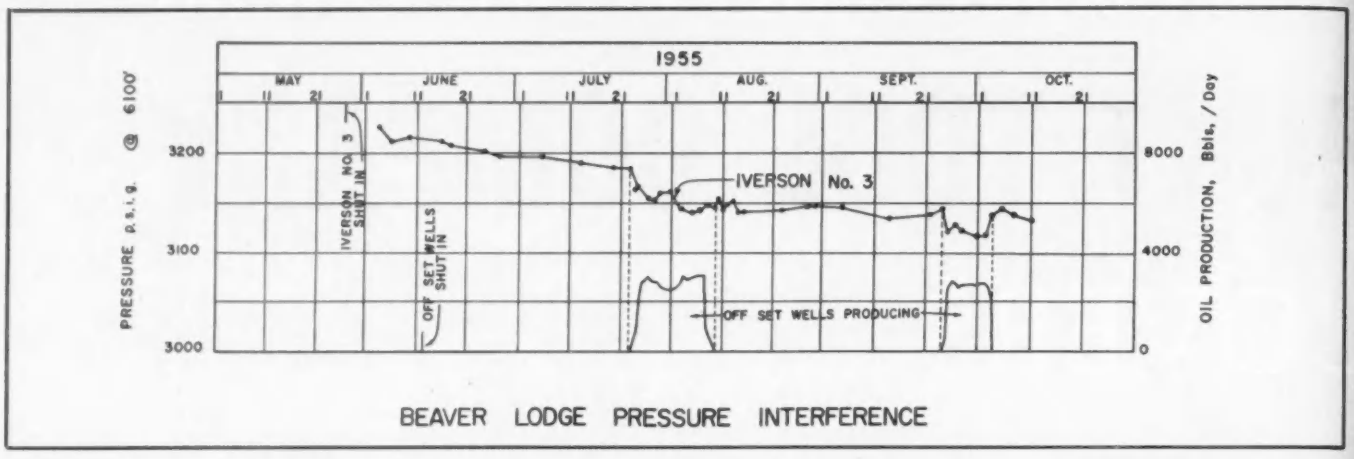


FIGURE 9—Results of interference test in Beaver Lodge–Madison Pool. Note how form of the production curve is reflected in the pressure curve.

owners is nil. Under such conditions, the decision on spacing can be based on technical evidence.

In the hearings held this year to determine the proper spacing for the Beaver Lodge-Madison, Tioga-Madison, Hofflund-Madison, and Charlson-Madison pools, evidence was offered to show that the pay interval, in these pools, is reasonably uniform; that there is communication between wells in the pools; and that wells, in these pools, are draining areas as great as 1000 acres.

Four principle forms of evidence have been introduced:

- Electric logs have been used to trace the pay interval from well to well and demonstrate its uniform character.
- Graphs have been introduced to show that wells drilled in recent months have recorded initial reservoir pressures close to the prevailing pressure, for that portion of the field, as shown by regular measurements in adjacent, earlier wells.
- Mathematical calculations have been made on the basis of production data to show the pressure distribution at various distances from wells. The calculation involves a modified form of the Darcy Law equation and the resulting pressures are plotted against drainage radius. From these graphs, it can be shown that wells draining an area of low permeability cause greater pressure drops, and therefore fluid movement toward them, than wells completed in areas of greater permeability. The slope of the pressure distribution curve at any point indicates the direction, and rate, of fluid flux at that point.
- During the summer of 1955, the Amerada Petroleum Corporation conducted extensive tests in the Beaver Lodge-Madison and Tioga-Madison pools. For the purpose of these tests, nine selected wells were shut in on the first of June and pressures were observed until mid-October. During the last week of July, offset wells to four of these test wells, two in each pool, were placed on production and two months allowable was taken over a two week period. These offset wells were shut in about 40 days prior to the production test. The drop in pressure, at the observation well, was recorded, and charted, and the resultant graphs showed clearly the communication between the test wells and their offsetting wells, drilled on the 80-acre pattern. The test was repeated again during the last week of September and the first week of October and the same results noted. (See Figure 9).

The remaining five observation wells, two in Tioga and three in Beaver Lodge remained shut-in during the entire four-month test period. The pressures recorded on these wells indicated a regular decline although the wells were not producing, showing that the reservoir was reacting to withdrawals from wells as much as 1980 feet away. The witness at the October hearing of the State Industrial Commission who introduced the results of the tests stated that the oil saturation of the reservoir was being reduced a the rate of one-fourth of 1 percent per 100 psi.

The market for crude oil produced from the Nesson anticline is, at this time, limited to the amount that can be processed by the Standard Oil Company of Indiana refinery at Mandan, N. D., and the Westland Oil Company refinery at Williston and the amount used by the operators in drilling and lease operations. For December, 1955, this market totaled 36,300 barrels per day and this approximates the MER for present fields. (A small amount of this crude goes to the Queen City refinery).

The oil is purchased by Stanolind Oil Purchasing Company at a posted field price of $2.90 per barrel. The oil is transported from Tioga to Mandan by Service Pipe Line Company through its crude oil line. Service Pipe Line Company also maintains the gathering lines in the fields.

A small refinery was built at Williston in 1954 but was later sold to the Westland Oil Company. Operation was resumed in November, 1955. The rated capacity of the refinery was 1500 barrels per day.

Signal Oil & Gas Company completed its Tioga gasoline plant in October, 1954. This is a very modern plant and was designed particularly for the climatic conditions in the area. No water cooling was used and the cooling system is equipped with heaters for winter use. All water used in the plant is confined to enclosed areas.

In addition to the usual products, this plant produces over 20 tons of elemental sulfur per day. The operation of this plant has practically eliminated the flaring of gas in the fields.

Residue gas equalling about 65 percent of the wet gas intake will be taken by Montana-Dakota Utilities for their Tioga-Minot pipe line. This line is also connected to their other distribution system at Williston in order that excess gas from the Tioga plant, during the off-peak season may be sent to underground storage in eastern Montana. **—The End**

Mud service engineers play an important part in helping the operators and contractors to maintain a correct mud program. Photo shows a service engineer checking the alkalinity of the mud.

Gulf Coast Drilling Mud Practices Demand Attention to Special Problems

Here is a roundup of drilling conditions on the Gulf Coast, showing how proper drilling mud practices have saved time, money, and in some cases a well.

By Dr. GEORGE R. GRAY, G. G. ALLEN and N. K. TSCHIRLEY
Baroid Division, National Lead Company, Houston

A CAREFULLY PLANNED mud program is essential to the success of deep drilling in the Gulf Coast. Such problems as sloughing shale, loss of circulation, abnormal gas pressures, salt water flows and dome salt must be anticipated. Selection of the rig and design of the casing program depend on conditions to be met in drilling.

All available information on the geology and previous drilling experience in the vicinity should be considered. Continuous improvement in methods, equipment, and materials accounts for the great increase in average depth of Gulf Coast wells.

Planning Gulf Coast Mud Programs. The Gulf Coast region consists of a band roughly 150 miles wide extending around the Gulf of Mexico

from Florida to the southern tip of Texas. Drilling problems are numerous and varied but in the main are those associated with deep drilling. Roughly 80 percent of all wells which have been drilled deeper than 15,000 feet are in the Gulf Coast. Of the 40 wells in the U. S. producing from below 15,000 feet, 32 are in coastal Louisiana. And, as is well known, the world's deepest well (22,570 feet) is located in Plaquemines Parish, Louisiana.

Careful planning of the mud and casing program is essential before drilling is commenced. Records of wells drilled in the vicinity should be examined before setting up a drilling program. Such records can be had from operators, contractors, and service and supply companies. The mud program may be affected by the drilling equipment available; by the information sought from logs, cores and drill-stem tests, and by the lithology of the formations drilled. All geological information and drilling histories of wells in the vicinity are utilized in planning the casing program and estimating mud weight requirements. Then the proper type of mud is selected.

Normally, if no trouble is expected, mud treated with caustic-tannin and poly-phosphate is used. Lime-treated mud commonly is used if one or more of these conditions is anticipated: thick shale section; mud weights above 12 pounds per gallon; salt water flow; or salty make-up water. Saturated salt mud is used to drill dome salt. Oil may be emulsified in any of these muds. Often more than one type of mud is required for a single well and the mud program must be adapted to changing conditions.

Consideration will be given to some of the major problems affecting the mud programs in the Gulf Coast. These problems are not new but some have been accentuated by deep drilling. Severity varies according to area. Continuous improvement, rather than sudden cure, is the usual case history in the solution of these problems.

Thick Shale Sections. Most Gulf Coast drilling involves the penetration of thick beds of shale. Two troublesome conditions are met: thickening of mud by dispersed shale particles, and sticking of tools by sloughing shale fragments.

Easily dispersed, mud-making shales aggravate the problem of viscosity control of weighted muds. When weighted mud is not required, a low (8-9) pH mud is used in drilling the shale and the concentration of clay solids is controlled by adding water. Caustic-tannin and phosphate thinners afford satisfactory mud properties. At high mud weights, the dilution necessary to control shale solid content requires the addition of so much barite that the cost becomes excessive. Consequently, most deep wells are drilled with high (11-13) pH muds treated with lime to diminish hydration and dispersion of shale.

The conversion of a low pH mud to a lime-treated mud is made by adding for each barrel of mud: 1 to 3 pounds of caustic soda, 1 to 3 pounds of organic thinner (tannin, mined lignin, calcium lignosulfonate, or combinations of these); 1 to 8 pounds of lime. Filtration may be reduced by the addition of pregelatinized starch, carboxymethyl cellulose, or both. Physical properties, such as weight, viscosity, and gel properties can be controlled fairly simply by giving attention to the solid content and the chemical properties of the mud. Chemical properties usually are within this range: mud alkalinity, P_m, 5 to 40 cc (lime 1 to 8 pounds per barrel); filtrate alkalinity, P_f, 2 to 9 cc and pH, 11.7 to 12.5.

Oil, either diesel or crude, is emulsified in most muds used in the Gulf Coast. Benefits are derived from the emulsion in lowered filtration, decreased torque on drill pipe, increased rate of penetration and extended bit life.

One example of a solution of the high-viscosity problem in thick shale sections is found in the Saratoga field, Hardin County, Texas. When muds treated with caustic-tannin and phosphates are used in drilling from 4900 to 8500 feet, funnel viscosity ranges between 65 and 90 seconds with mud weights between 10 and 12 ppg. Average cost of mud materials is about $8500 per well. When lime muds are used for the same interval, the funnel viscosity ranges between 44 and 52 seconds for the same mud weights. Average cost of mud materials is about $6500.

Drilling now progresses without serious interruption in many areas that formerly were condemned as hopeless because of "heaving shale." Lime-treated emulsion muds are now used routinely to drill shale sections in Matagorda and Calhoun counties, Texas, where only a few years ago "pickling" of the shale by sodium silicate was considered necessary. Throughout the Gulf Coast, the sloughing shale problem has been diminished by improvements in drilling equipment and mud compositions. Careful drilling practices are recognized as important in controlling sloughing shale.

An example of troublesome shale is that found in the Deep Lake field, Cameron Parish, Louisiana, at depths of 12,500 to 14,000 feet. Caliper measurements reveal hole enlargements intermittently throughout the section. Sloughing of shale is evident at the surface from the large quantity of shale pumped out while drilling; from the fill of as much as a hundred feet of hole after a trip, and occasionally from a tendency of the pipe to stick, especially when a connection is being made.

Several methods are followed to solve the sloughing shale problem. Often more than one remedial measure is used at a time. Measures are taken to:

1. Reduce filtration to decrease hydration of the shale. Emulsify oil in the mud to lower filtration and to lubricate the hole.

2. Reduce gel strength to minimize swabbing effects caused by moving pipe in the hole.

3. Raise mud weight to oppose overburden pressure tending to force shale into the hole.

4. Raise the annular velocity of the mud to keep the hole free of shale. If the annular velocity cannot be raised, decrease the drilling rate.

5. Raise the viscosity of the mud to increase the carrying capacity, if the annular velocity is inadequate.

6. Maintain proper weight on the

Frequent mud checks are made on mud weight, viscosity, water loss, etc. Here a mud engineer checks the mud viscosity with a funnel.

bit. Insufficient drill collars may allow the pipe to be put in compression and the bending pipe may knock the shale from the wall of the hole.

7. Manipulate the tools gently. Avoid rapid application of pump pressure, fast movement of drill string, or other action that would create turbulence or pressure surges.

Calcium surfactant mud developed in Magnolia Petroleum Company's research laboratory offers a new solution to the sloughing shale problem. In an exploratory test in Jackson County, Texas, more than 10,000 feet of Vicksburg and Jackson shale was drilled in reaching a depth of 19,057 feet.

High Pressures. Pressures in excess of the "normal gradient" of 46.5 pounds per square inch per 100 feet of depth are so commonplace in the Gulf Coast that the API group that studied the problem defined an "abnormal pressure well" as one that required muds weights above 12 pounds per gallon for drilling. Even under this more liberal definition, "abnormal pressures" can be anticipated below 10,000 feet in almost any well along the Texas coast. Such fields as Red Fish Bay, George West, Magnolia Beach, Shepherds Mott, Chocolate Bayou, and Raywood, to name but a few, are abnormal pressure fields. Along the Louisiana coast, some deep fields have near "normal" pressures; e.g., wells have been drilled to about 15,000 feet in Cameron, St. Mary and Terrebonne parishes with muds weighing no more than 13 pounds per gallon. In these same parishes, however, many more wells have required mud weights above 16 pounds per gallon. Abnormal pressures in the vicinity of a salt dome are illustrated by two wells (completed at 14,250 feet) in the Four Isle field, Terrebonne Parish. One well had a shut in pressure of 6700 pounds per square inch and another well nearby had a shut-in pressure of 11,600 pounds per square inch.

Muds weighing from 12 to 18 pounds per gallon have a high content of suspended solids and the solid content directly affects the viscosity. The most important factor to be dealt with in the maintenance of heavy muds is the concentration of drilled solids in the mud. Lowering the content of drilled solids by dilution requires large quantities of barite for maintenance of weight. Chemical treatment to oppose the dispersion of shale into the mud normally involves the use of lime, as discussed in the previous section.

The mechanical removal of drilled

solids by means of the centrifuge allows the return of the barite to the mud. Routine use of the centrifuge in the Chocolate Bayou field, Brazoria County, Texas, not only has effected savings in the barite used to maintain 15 to 18 pounds per gallon muds but also has simplified the control of flow properties of the mud. By keeping the clay content to a minimum, the tendency of the mud to thicken on standing at high temperatures is reduced. Swabbing is diminished by reduced gelation.

High-pressure salt water flows are not uncommon on the Gulf Coast and the possibility of getting salt water into the mud should be considered in selecting the mud treatment. Lime-treated mud is used if salt water intrusion is likely. Salt water flocculates lime mud to some extent but satisfactory properties can be maintained by increasing chemical treatment.

Careful drilling practices are as essential to safety in drilling in high-pressure areas as are adequate mud weights. Some of these practices are:

1. Pump returns from bottom after a drilling break. If the mud shows no gas, oil or salt water from bottom, resume drilling. If there is a show which continues for over 15 minutes, raise the mud weight gradually.

2. Make a "short trip" before coming out of the hole immediately following an increase in mud weight. Remove 2000 to 3000 feet of pipe from the hole. Go back to bottom and pump the mud off bottom. If mud from bottom is gas cut, raise the weight and make another short trip.

3. Pull the pipe slowly to prevent swabbing.

4. Keep the hole full on trips.

5. Watch for increase in volume of mud in the pits.

Loss of Circulation. Loss of mud in Gulf Coast drilling occurs in gravel beds, in cavernous and highly permeable limestone, and in fractured and fissured formations. Shallow gravel beds are troublesome at times but usually mud loss is stopped by pumping in a thick suspension of fibrous, flake or granular materials. Cavernous and vugular formations that cause difficulty are coral beds, the Het lime (heterostegina marker) and salt dome caprock. The most serious problems of lost circulation are associated with fractured and fissured formations which take mud under the hydrostatic pressure required to safely overbalance the formation fluid pressures.

Many and varied attempts have been made to maintain circulation while drilling the coral beds in southern Florida. Results have been so poor that drilling without returns has become the accepted practice. Surface casing (500 to 1500 feet) is set with mud. When returns are lost, blind drilling is continued. Large volumes of water are pumped into the hole to carry the cuttings into the caverns in the rock. Casing is set when a depth is reached beyond which circulation can be expected.

A floating mud-cap is used where formations above the cavernous zone must be protected. For example, in the Pierce Junction field, Harris County, Texas, when circulation is lost into the cavernous zone at depths of 1100 to 2600 feet, water is pumped in through the drill pipe and mud weighing about 9 pounds per gallon is pumped through the annulus. Mud is hauled by vacuum truck from reserve pits of other wells in the field. The mud level stands in the hole within 100 to 200 feet of the surface. As much as 50,000 barrels of water and mud have been used in drilling the 500-foot zone of loss. Cores are taken at intervals to determine when the cavernous zone has been passed. Liner is then set and normal drilling is resumed.

Aerated salt water has been used in drilling on the Barbers Hill salt dome in Chambers County, Texas. Loss of circulation occurs at about 1300 feet with salt water and the level stands about 200 feet below the surface. A surfactant is added and air is injected into the pump discharge in the ratio of 2½ cubic feet of air per cubic foot of water. Circulation is established at this reduced hydrostatic head.

Loss of circulation in the Het limestone usually is overcome by reducing mud weight to the minimum and spotting batches of mud loaded with bridging and plugging materials. In the Fannette field, Jefferson County, Texas, the Het lime is penetrated from 5500 to 8500 feet, depending upon the location of the well on the structure. When circulation is lost, one practice is to spot in the hole about 100 barrels of mud containing 15 to 20 pounds per barrel of ground walnut hulls. The bit is pulled up into the casing, more mud is mixed, and the pipe is run slowly back into the hole. The mud is circulated at frequent intervals. If returns are lost before the bit reaches bottom, another batch of mud containing granular and fibrous material is spotted. If circulation is not restored after three batches have been placed, either a bridging plug or a bentonite-oil plug is squeezed into the zone of loss. The bridging plug consists of 30 to 50 barrels of mud containing 30 to 50 pounds per barrel of ground walnut hulls. For the bentonite-oil plug, about 20 barrels of a slurry of 200 to 400 pounds of bentonite per barrel of diesel oil is pumped through the open-ended drill pipe while about 100 barrels of mud is pumped in through the annulus.

The most expensive and troublesome instances of lost circulation occur when the hydrostatic pressure in the hole exceeds the structural strength of the formation. Losses to fractures or fissures may be caused by excessive mud weight or by improper drilling practices, or both.

Most deep wells require high mud weight. Protective casing must be set to prevent loss of mud to shallower formations. Selection of casing points on wildcat wells may be very difficult because the maximum mud weight which can be maintained without loss cannot be predicted from one area to another. Normally, 12 to 13 pounds per gallon can be used without loss in wells having 2000 to 3000 feet of surface casing. But no generalization is safe. Thus, in Black Bayou field, Cameron Parish, Louisiana, 16 pounds per gallon mud was not lost with 5600 feet of casing, while the same weight mud was lost in Lake Washington field, Plaquemines Parish, with nearly 14,000 feet of casing. After casing has been set it is important to establish beyond doubt that the casing has been properly cemented before drilling is resumed.

All possible precautions should be taken to avoid loss to induced fractures. These precautions can be summarized as, "treat the hole gently." Some safe practices are to:

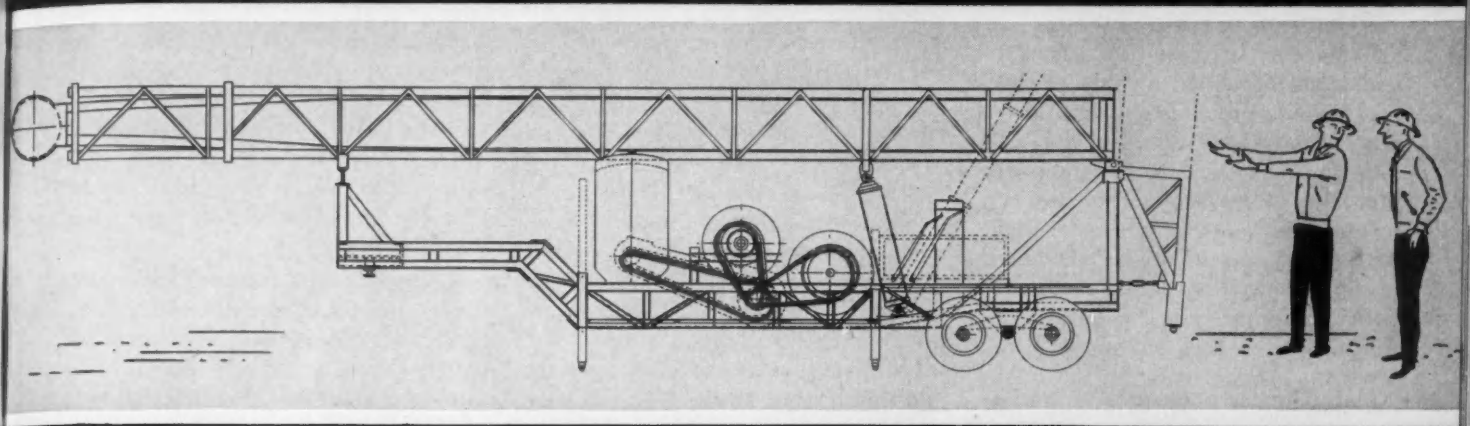
1. Maintain uniform mud characteristics of minimum weight, viscosity, gel, and filtration.

2. Avoid small annular clearance.

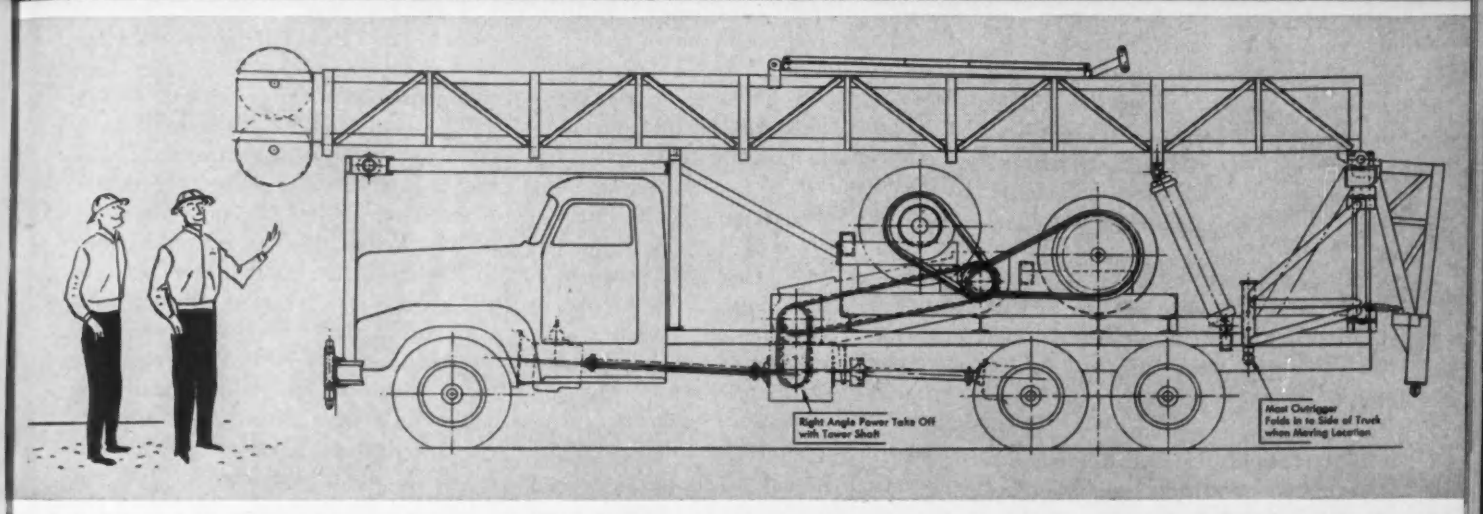
3. Move the drill string slowly.

4. Break circulation frequently when going in the hole.

Pick the Winch Drive System You Want



WILSON MANUFACTURES BOTH



Wilson built winches on trucks, with power-take-offs, of Wilson make as early as 1928, and several thousand of these were made, but these were discontinued just before the war because most customers preferred the separate engine.

Recent state restrictions on weight and size have forced well servicing contractors and other users to ask for a "good power-take-off" that will "stand the gaff" of rugged oil field service with a very minimum of "down time" and maintenance cost. We have now designed, field tested and proved what our customers have told us is "*the best heavy-duty truck power-take-off ever built.*" It incorporates many new features never before available in any power-take-off and is built so that is can be used in any make or size of heavy truck.

For the first time users can now obtain a *Modern* High Capacity Mast, with a *Modern* Heavy Duty Air Tube Clutch Drum Winch, with High and Low Clutch drum speeds, and new lightweight clutches which never need adjustment; with this truly *Modern* "1954 Model" Power-Take-Off! And these new units are legal as regards to length, width and height, and *weight distribution!* The Super 38 Double drum units with tubular masts and the usual amount of lines and tools can be made legal in most states. Fabricated Masts on *double drum* units with lines and tools may require permits.

BE MODERN — BUY WILSON

The Lightest, Strongest, Best!

Wilson

The FIRST NAME in OIL FIELD WINCHES

WILSON MANUFACTURING CO., Inc.

The HOME of RED IRON • WICHITA FALLS, TEXAS

5. Prevent balling of shale on drilling tools.

6. Start mud pump slowly.

When loss of circulation occurs the bit should be pulled up into the casing. Drilling practices and mud properties should be examined for possible causes of the loss. After allowing the hole to remain undisturbed for several hours, attempts can be made to circulate in the casing. In many instances a waiting period of 8 to 24 hours serves to stop the loss. If the waiting period does not stop the loss, a survey can be made to locate the loss zone. Then a plug of walnut hulls, gel cement, bentonite-oil, or time-setting clay can be placed.

This procedure was employed on a well drilled in the San Ramon field, Hidalgo County, Texas, in which circulation was lost at 8250 feet when the mud weight was raised to 17.5 pounds per gallon. The bit was pulled into the 7-inch casing set at 8135 feet and 20 barrels of mud containing 50 pounds per barrel of ground walnut hulls was squeezed into the open hole. A pump pressure of 800 pounds per square inch was established. The well was then drilled to 8855 feet without further loss of mud which weighed as much as 17.9 pounds per gallon.

The method followed on a well in the Pharr field, Hidalgo County, Texas, is an example of avoidance of lost circulation by setting a liner. The field program is to set about 8400 feet of protective casing and to raise the mud weight gradually to 18.5 pounds per gallon before a depth of 9500 feet is reached. On one well, with 9⅝-inch casing set at 8432 feet, circulation was lost at 9508 feet when the mud weight reached 18.3 pounds per gallon. Instead of combatting lost circulation by the usual means, a test tool was set at the bottom of the casing to seal the casing from the open hole. The weight of the mud in the casing was reduced to 17 pounds per gallon. The test tool was removed, a bit was run in, and all of the mud was adjusted to 17 pounds per gallon. The hole was deepened to 9532 feet and a 7-inch liner was set. No loss of mud occurred in drilling to 10,735 feet with mud weighing 18.7 pounds per gallon.

High Temperature. Mud temperatures above 250° F. have been measured at a depth of 10,000 feet in southwest Texas and 400° F. was reported at 19,050 feet in Jackson County, Texas. Temperatures at comparable depths are not as high in coastal Louisiana. For example, in Cameron Parish, 303° F. was reported at 14,000 feet and in Plaquemines Parish, 350° F. at 21,960 feet.

High temperatures found in deep wells aggravate the problem of control of mud properties. Reactions are speeded up. Organic dispersing and filtration-reducing agents break down; alkalies react with the clays, and the end result is a thick, high-filtration mud unless a continuous program of treatment is followed.

Recognition of the factors involved in the stiffening of lime-treated muds at high temperatures has made practical a program of control that has greatly extended the usefulness of these muds. A lime-treated mud was used by Richardson and Bass in reaching the world's record depth of 22,570 feet. Pilot tests are conducted at temperatures somewhat higher than those to which the mud is being subjected while drilling. These tests serve as a guide for treatment. Major factors in control of lime-treated muds are: (1) low concentrations of lime and caustic soda, (2) low content of clay and sand, (3) moderately high concentration of heat-stable dispersing agent.

Difficulties caused by the increased gelation of clays at high temperatures can be avoided by mechanical removal of the clays. The centrifuge can be used to reduce the clay content of a heavily weighted mud. CMC can be used to aid in suspending the barite.

The calcium surfactant mud used by Magnolia Petroleum Company in setting the Texas depth record of 19,057 feet shows no increase in viscosity and gel when heated.

Rock Salt. Over 200 salt domes are known along the Gulf Coast. Oil production from the flanks of many of these structures involves drilling through salt from a few hundred feet to over 13,000 feet. The casing and mud programs depend on such factors as depth of the salt, thickness of the salt, mud properties required in drilling formations above and below salt, etc.

After conductor pipe is set, fresh water mud is used until the top of the salt is penetrated. One of several programs may then be followed:

1. Set casing in the top of the salt. Discard the mud. Saturate the water with salt and drill the salt with saturated salt water. Add attapulgite clay if needed to clean the hole. Near the base of the salt, reduce filtration by the addition of starch. Set casing through the salt. Discard the salt water mud. Drill with fresh water mud to completion and set production casing or liner.

2. Prepare a saturated salt water mud using starch to reduce filtration. Drill the salt section and then set casing through the salt. Discard the salt water mud and complete the hole with fresh water mud.

3. Set casing in the top of the salt. Drill with saturated salt water mud to total depth and set production casing.

The program followed on several wells in the Pierce Junction field, Harris County, Texas, may require only two strings of casing. Surface casing (10¾-inch at about 1100 feet) is set close to the top of the caprock. If circulation is lost in the caprock, a liner is set after drilling through the zone of loss. When the salt is encountered (3200 feet) the bit is pulled up into the casing. The mud is diluted with water and 125 pounds of salt per barrel is added. After the mud has been saturated with salt, starch is added to reduce filtration to about 2 cc and drilling is resumed with this mud. At about the base of the salt (3600 feet) diesel oil is added to the mud. Drilling continues with the salt mud to final depth (4800 feet).

Sea Water Mud. With the rapid increase in offshore drilling, more attention is being given to the use of sea water in the mud. The cost of moving fresh water to the location is significant but of more importance is the ready availability of the sea water.

Sea water muds have the advantages of reduced hydration of shales and tolerance for salt water flows. Disadvantages are difficulties in controlling gel properties and reduced magnitude of the SP log. Costs for chemicals are higher than for fresh water muds.

Lime muds made with sea water are treated in much the same way as when fresh water is used for makeup. When lime is not used, pH is controlled between 9 and 11, depending on the salt concentration. Mined lignin thinners are often used. Filtration is controlled by adding CMC.

—**The End**

Wire Rope at Work—This was moving day for the Sharp Drilling Company, Midland, Texas. The rig had drilled beyond 10,000 ft on the D. W. Wright Lease, Northwest Sherman Field, and now the time had come to pull up stakes. The photograph shows three of the crew as they began preparations for the move.

The rig components were due for a breathing spell, though it would be a short one. The Bethlehem rotary line, for example, was already earmarked for the next drilling job. A 6x19 Seale in the Purple Strand grade, it was good for many more ton-miles of service. This Bethlehem rope had weathered some pretty mean drilling, yet it was still full of life, still very fit, and entirely ready for the tough work ahead.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

PETROLEUM • MINING • QUARRYING • CONSTRUCTION • EXCAVATING • LOGGING • MANUFACTURING

A Gulf Coast Feature . . .

Diesel-Electric Rigs Making a Comeback

New designs are bringing the engine-electric power plant back into the picture. Power flexibility, speedy rig-up, low maintenance costs, and space-saving factors are some of the advantages that could make this the rig of the future.

By E. E. CHILDRESS
Stewart & Stevenson Services, Inc.
Houston

THE ENGINE-ELECTRIC power plant for rig operation is gaining popularity, more especially in the field of offshore activity. Use of the equipment entails certain advantages as well as disadvantages. And, not unlike a vast majority of oil field equipment, the engine-electrical rig cannot be looked upon as the universal tool for oil well drilling. However, under certain sets of circumstances, this type rig can be used to definite advantage and its future potential in the field is unlimited.

The electric-drive drilling rig is not new. As far back as the 1920's, some rigs for field development projects were fitted with converters and motors and used purchased electric AC power.

For some purposes, these rigs were quite satisfactory and even today, they are occasionally used where the noise of conventional drilling engines is not acceptable. Some of the locations around Los Angeles are good examples of this type application. The controls of these early American rigs were cumbersome, complicated and expensive, and consequently they did not achieve great popularity.

As transmission designs improved and better drilling engines became available the mechanical drive drilling rig came into its own and electric drive became an insignificant part of the total market. A little later, with mill type industrial motors and generators similar to those used in steel mills were tried and a few rigs were sold using this type of equipment. However, initial cost was quite high and drilling crews were unfamiliar with the type of maintenance this equipment required. With the advent of fluid couplings and torque convertors, the demand for electric drive rigs virtually ceased.

Recently, the increase in barge drilling in South Louisiana and offshore drilling have revived interest in electric drive rigs. In both cases, very large rigs were required to handle the deep drilling. Furthermore, in the past two years, relatively low cost DC motors and generators designed for other high production purposes and particularly suited for drilling rig service became available.

In recent months, conversation in oil field circles everywhere has been devoted to diesel and gas engine electric drives versus mechanically driven power rigs. The purpose here is to take up some of the "pro's and con's" of both methods of drive as well as to clear up some of the questions associated with engine electric drive for drilling rigs.

It is not intended that the discussions on advantages or disadvantages be construed as a rule by which one can assume that either arrangement —engine-electric or engine-mechanical drive can be more effective for all drilling rig purposes. The writer realizes fully and wishes to point out that in his opinion both arrangements have their place in the drilling pic-

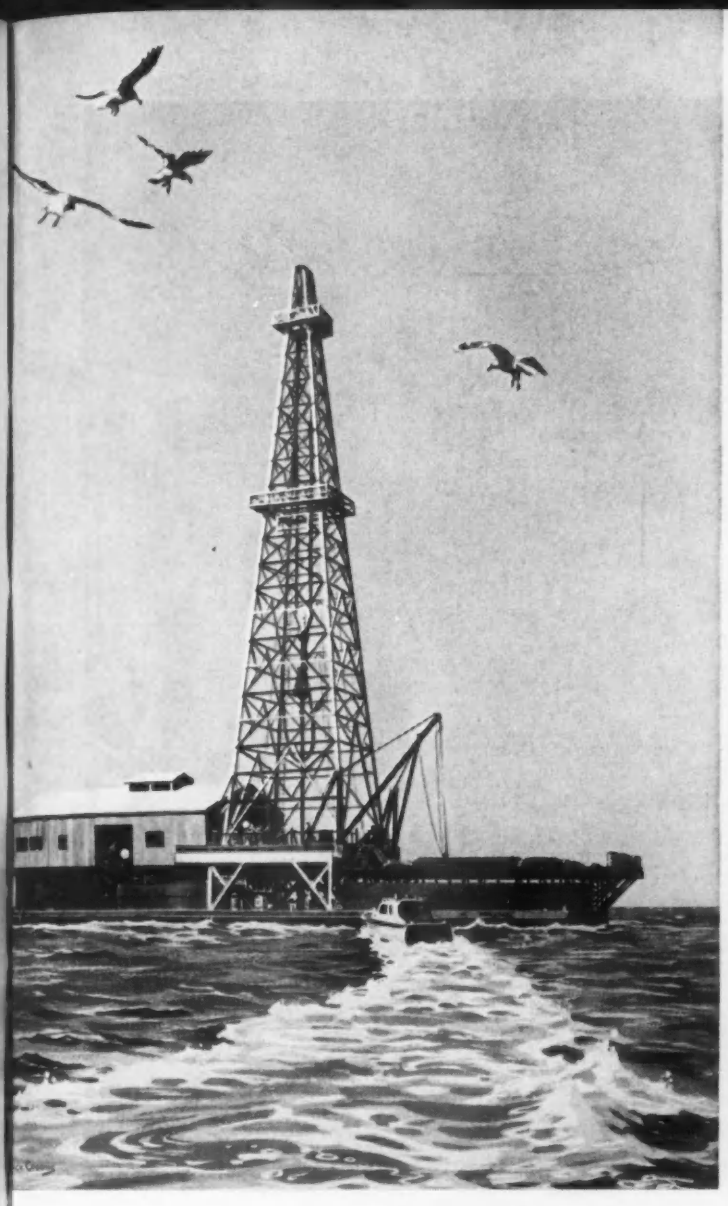
Pro's and Con's of Diesel-Electric Rig

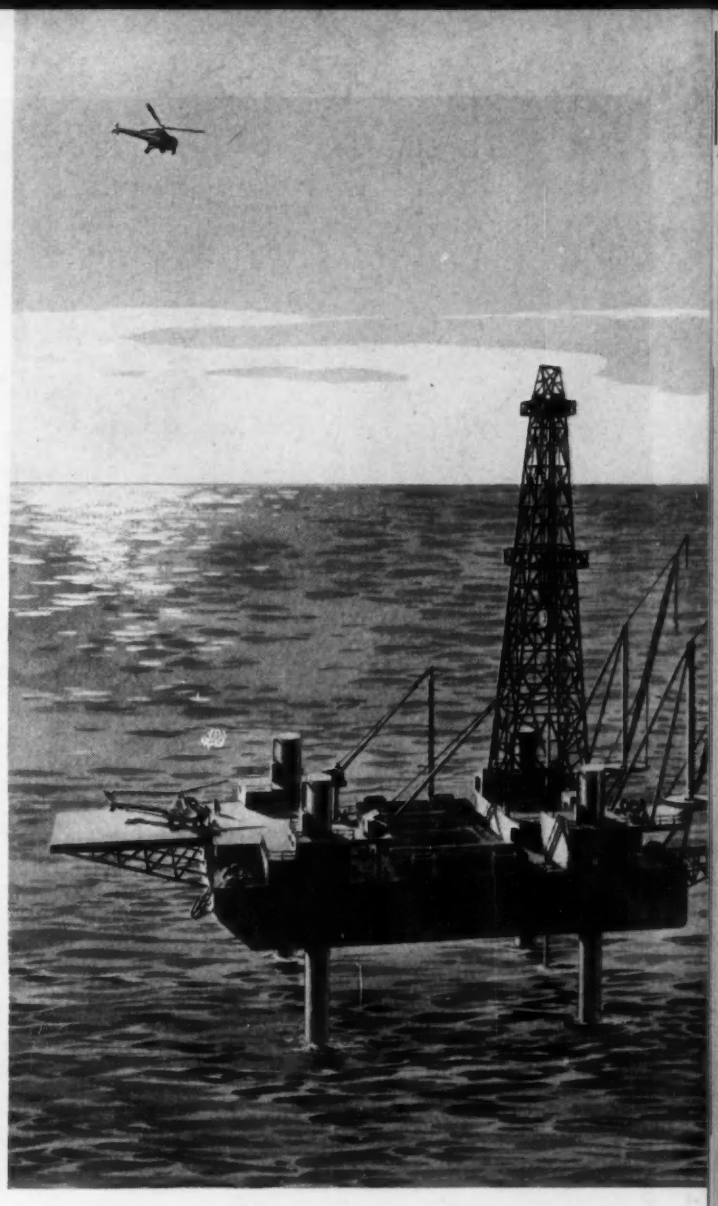
Advantages:

1. **Flexibility of operation.**
2. **Dependability, even at reduced power.**
3. **Longer engine life with lower maintenance cost.**
4. **Better utilization of available space.**

Disadvantages:

1. **High initial cost, $75 to $100 per hp.**
2. **Lack of electrical training in use and maintenance.**
3. **Lack of service facilities due to relatively small number of these rigs in present use.**





Bethlehem Can Build It All

Building a marine drilling outfit is such a complex operation that the highest degree of coordination is necessary. It is not a job where a mistake can be written off casually. Every component, from crown block to the bottom of the hole, must be perfectly matched to every other. For this reason it is important that the builder be fully integrated; that his experience equip him to handle every phase of the work.

Such a service is available through the combined facilities of Bethlehem Supply and the Shipbuilding Division of Bethlehem Steel. From this one service it is possible to obtain a complete marine drilling outfit — submersible barge, mobile platform, or stationary platform, equipped with either mechanical or diesel-electric plant. The rig can be fitted out for any drilling depth desired. Everything is included, down to the smallest detail of the crew's living-quarters.

This means undivided responsibility, with one supplier standing behind everything. It saves worries and delays that might otherwise plague the purchaser. Frequently, too, it can save him important money.

Bethlehem was a pioneer in the building of marine drilling equipment. As a result, Bethlehem outfits are more than just reliable; they incorporate features that extend far beyond today's needs.

When considering rigs of this kind, you are invited to consult with our engineering staff. Their background and experience can be of tremendous value in your planning. Always feel free to take advantage of their services.

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second St., Tulsa, Okla.

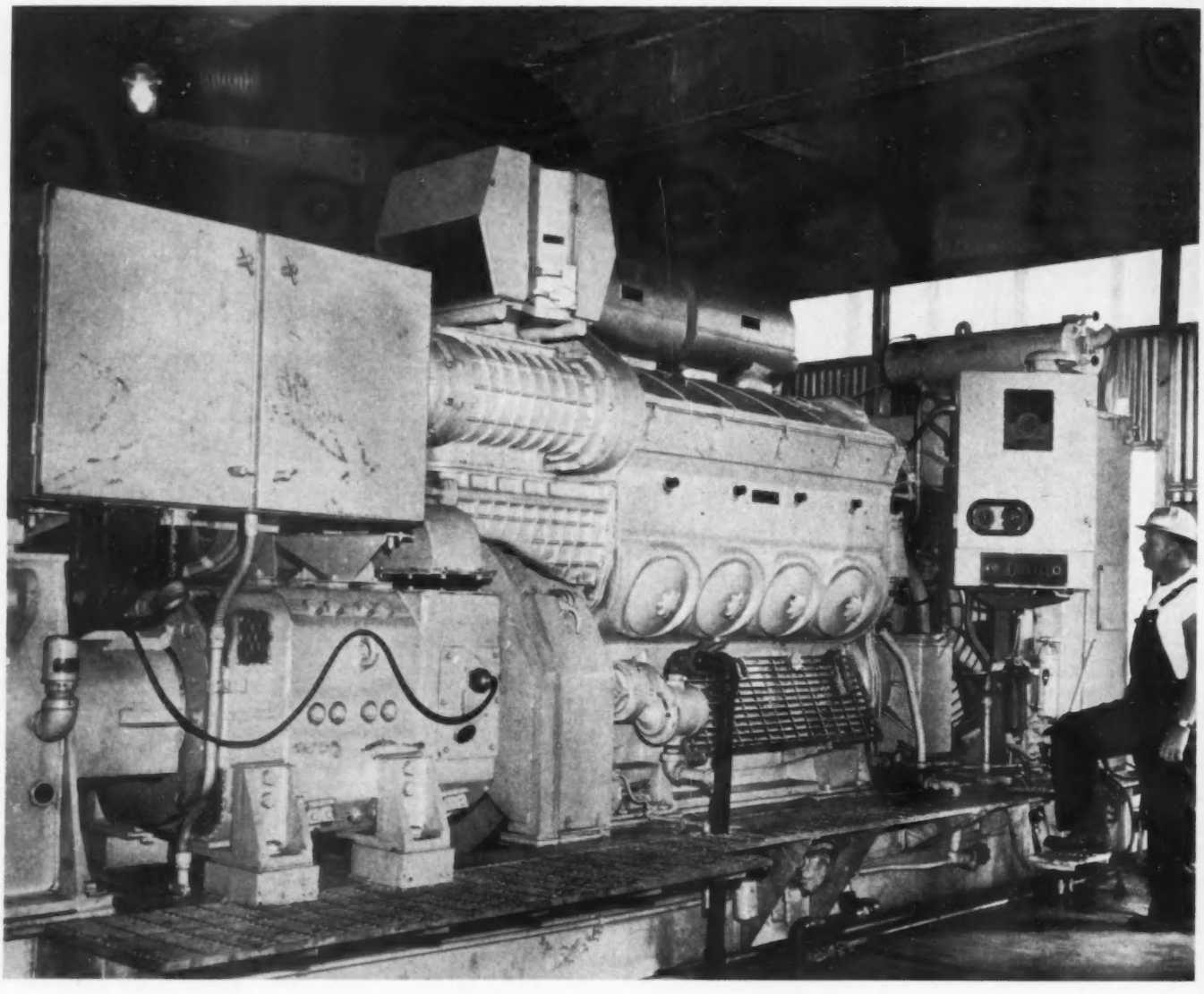
West Coast Headquarters:
Los Angeles, Calif.

Export Distributor:
Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

BETHLEHEM STEEL

BETHLEHEM SUPPLY

BETHLEHEM SUPPLY



The engine-electric power plant is gaining popularity in offshore work. Seen above is an 875-hp diesel-electric generating set currently operating on one of the Phillips Petroleum Company offshore rigs.

ture and the merits of both should be considered as they apply to the specific application before making a selection.

Some Advantages

Flexibility—Utilization of available rig power where needed is a distinct advantage of engine-electric drive power. By simple control arrangement the total power can be utilized to the best advantage. Since power is in the form of electricity produced by multiple generator power units, the total power available can be divided as required for any combination of drilling and hoisting. Drilling speeds can be changed without effecting pump operation and any pump operation can be changed without effecting rotary speeds. Independent operation on any rig component gives flexibility not possible with mechanical rigs of the same horsepower. Speed control from zero to full speed can be accomplished on any component without changing the speed of the engines.

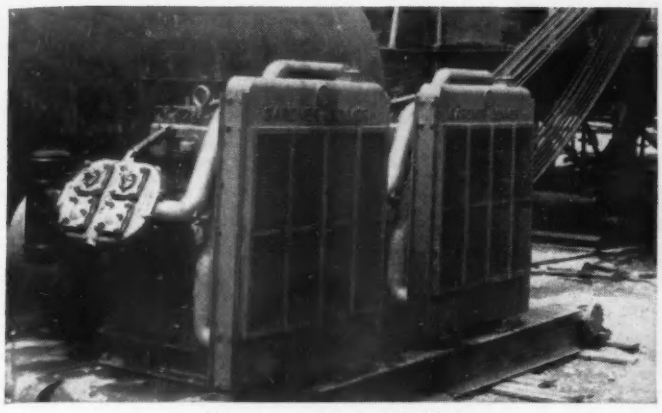
Dependability—Dependability can be definitely assured by the use of a number of engine-electric power units per rig with each unit consisting of one engine and multiple generators or multiple engine and generator combinations. Operational failure of an engine or generator does not mean failure of rig operation as in the case of failure of a main power drive in a mechanical rig operation. Multiple motor drives on the drawworks and main pumps also provides safety and dependability since operation at reduced power can be maintained in the event of an electric motor failure.

The construction and simplicity of controls, motors and generators and their construction of course, contributes greatly to their dependability. Elimination of clutches, free wheeling sprockets and sheaves and power transfer compounds and the use of simple chain drives gives engine-electric rig power units a definite advantage for dependable operation over straight mechanical or hydraulic combination rig drives.

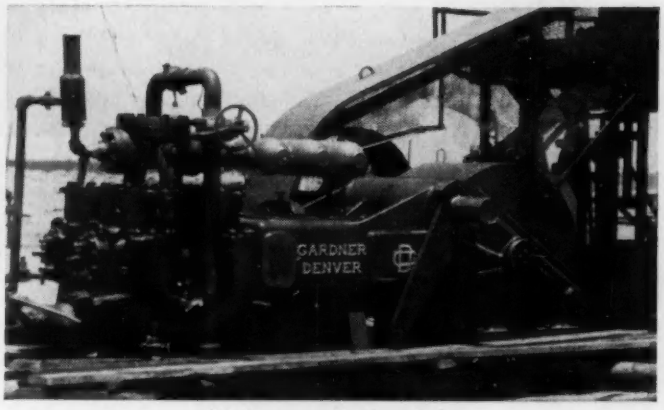
Longer Engine Life—Maintenance costs with electric drive are usually lower and the length of time between engine overhauls is greater than with the same make engines on a mechanically driven rig. This is true because the engine can be operated constantly at their most favorable speeds without the necessity for long idling periods, lugging down, or frequent accelerating. Engines on an electric drive do not take the "beating" which they are subjected to on a mechanical rig.

A simple illustration of this advantage familiar to almost anyone oper-

Gardner-Denver . . . Serving the World's Basic Industries



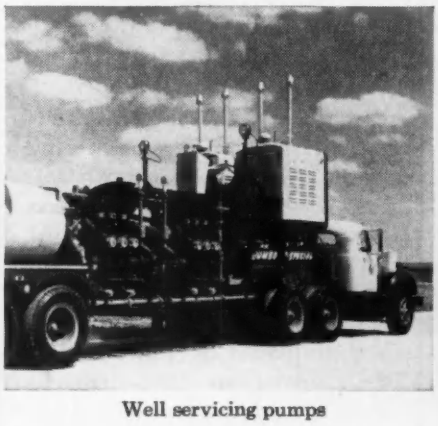
Compressors for air drilling



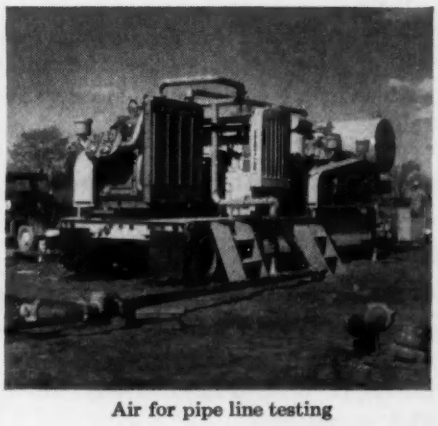
Mud pumps for deep holes

In step with oil industry progress
Gardner-Denver quality equipment

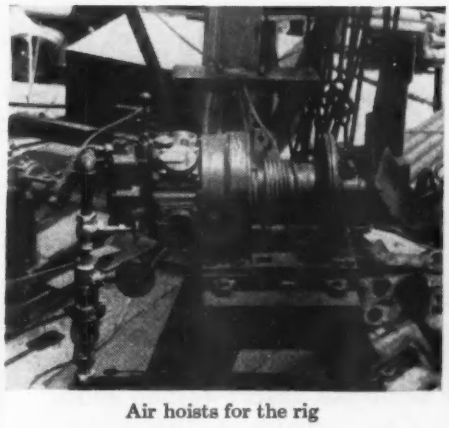
Gas booster compressors



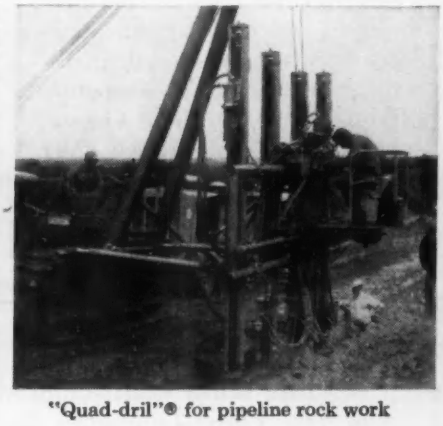
Well servicing pumps



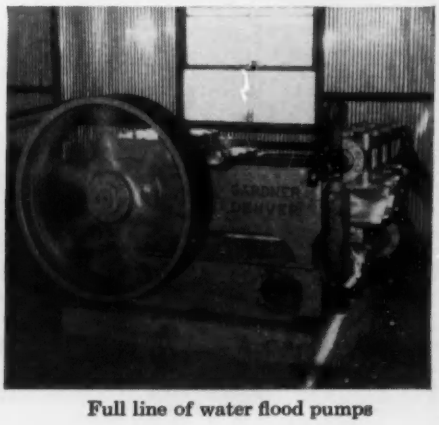
Air for pipe line testing



Air hoists for the rig



"Quad-dril"® for pipeline rock work



Full line of water flood pumps

In drilling . . . producing . . . pipelines . . . Gardner-Denver equipment leads the way! Send for details.

GARDNER - DENVER

THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS
FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois — Gardner-Denver Export Division, 233 Broadway, New York 7, N. Y.
In Canada: Gardner-Denver Company (Canada), Ltd., Winnipeg—Edmonton—Toronto

Oilfield Offices:
Dallas, Houston, Tulsa, St. Louis, Los Angeles, New York, Pittsburgh, Denver, New Orleans, San Francisco, Kansas City

ating drilling rigs, can be noted in the operation of the constant speed, AC electric generator sets used on most mechanically powered rigs. It is interesting to note that in most cases the auxiliary engines on the AC generator sets usually get less attention than the main engines, yet give less trouble and operate throughout long periods of service with a minimum of adjustments or repairs.

Better Utilization of Existing or Available Space—Often times, especially in the case of offshore rigs, the arrangement or manipulation of machinery to fit existing or available space can be a factor of great importance. With diesel or gas engine-electric drive, small compact electric motors can be used for driving the drawworks, mud pumps, rotary, etc. and the main power plant can be located wherever there is space available.

This is simple and inexpensive from the standpoint of rigging up and installation inasmuch as the main requirement is simply to string up cables. On an offshore rig platform or mobile unit, the saving in construction costs of a few square feet can actually mean a reduction of thousands of dollars.

On a land rig the flexibility of arrangement of the power with electric drive often permits economical mounting of the equipment on trailers reducing rig-up and moving time which also saves thousands of dollars.

Disadvantages

After considering the advantages of electric drive, it may be difficult to understand why electric drive is not used more widely, so it is well to examine the disadvantages that have in the past limited the use of electric drive.

High Initial Cost—The first and most important disadvantage has been of course, higher initial cost. Now however, with the use of high volume production line components and simple control systems such as have been recently introduced, the cost picture is considerably more favorable to engine-electric drives with the total cost of engine-electrical equipment running about $75 to $100 per horsepower in the 1000-horsepower range. This is only slightly higher than a good mechanical drive system and it is entirely possible that the savings affected in lower cost drawworks requirements as well as in substructure requirements often cause the completed rig to be less expensive than mechanical drive when all factors are considered.

It is possible today to buy an excellent engine electric drive system complete with either diesel or gas engines, generators, motors, controllers and all necessary fabrication for less than $100 per horsepower. At this price, electric drive becomes a very major contender for rigs of 1000 horsepower and more as well as smaller trailer mounted rigs.

Lack of Electrical Training—The users' lack of knowledge of electrical equipment is a serious psychological disadvantage that cannot be overlooked. Generally speaking, toolpushers, drillers, and crews understand mechanical drive and know how to use it and maintain it. These same men have little understanding of electricity and usually are not qualified to do anything more than the simplest routine maintenance. This disadvantage, however, is more psychological than factual with today's simpler and more floor proof control systems.

Lack of Service Facilities—The lack of service has been another serious drawback to electric drive; however, as more electric drive equipment is being put into service, service facilities are comparable to those that now exist for mechanical drive and as the psychological fear of the electric drive wears off, many heretofore "disbelievers" in engine-electric drive for drilling rigs will have to admit that some present day engine-electric arrangements offer actual advantages from the standpoint of simplicity and ease of maintenance. —**The End**

About the Author

E. E. CHILDRESS is a graduate in mechanical engineering from Texas Technological College, Lubbock, Texas. He has been associated with oil industry equipment and power requirements since he graduated from Texas Tech in 1942. He was employed by Portable Rig Company from 1942-1946. In 1946, he joined Stewart & Stevenson Services. He has held various assignments with Stewart & Stevenson, including district manager of the company's West Texas branch in Odessa. In 1954, he was named chief engineer for Stewart & Stevenson Services.

Offshore Oil and Gas Map

A large-scale multi-colored separate insert folded map of the Texas-Louisiana Gulf Coast region accompanies some copies of this issue of WORLD OIL. It covers the offshore area and adjacent inland territory. The map shows such features as oil and gas pipe lines, oil and gas fields, and offshore lease ownership. The map is in copies distributed in the Texas-Louisiana-Mississippi area. Other subscribers can obtain the map free of charge by writing WORLD OIL, Box 2608, Houston 1, Texas.

HOMCO

HOUSTON OIL FIELD MATERIAL COMPANY, Inc

Now Serves You In

CANADA — with a complete line of fishing and cutting tools. Trained supervisors are available at all times in Canadian oil fields.

NEW YORK CITY — with a complete export division.

MEXICO CITY — with a full-time Homco employee handling equipment and services.

These new locations, combined with Homco's 41 branches in the United States, maintain Homco's leadership and position as the World's largest independent oil field supply and service organization.

Whatever you need in the oilfields — supplies — cutting or fishing — directional drilling — electrical well services — Homco has the men, the materials and the services near you to do the job and do it right.

THE WORLD'S LARGEST INDEPENDENT OILFIELD SUPPLY AND SERVICE ORGANIZATION

DIRECTIONAL DRILLING • FISHING AND CUTTING • OILFIELD SUPPLIES • ELECTRICAL WELL SERVICE

Whipstocks • Spud Bits • Deflecting Tools • Combination Jar and Key-Seat Reamers
Hole Openers • Mechanical Orienting Tools • Single Shots
Go-Devil Multiple Shot Instruments • Replaceable Blade Stabilizers

HOMCO

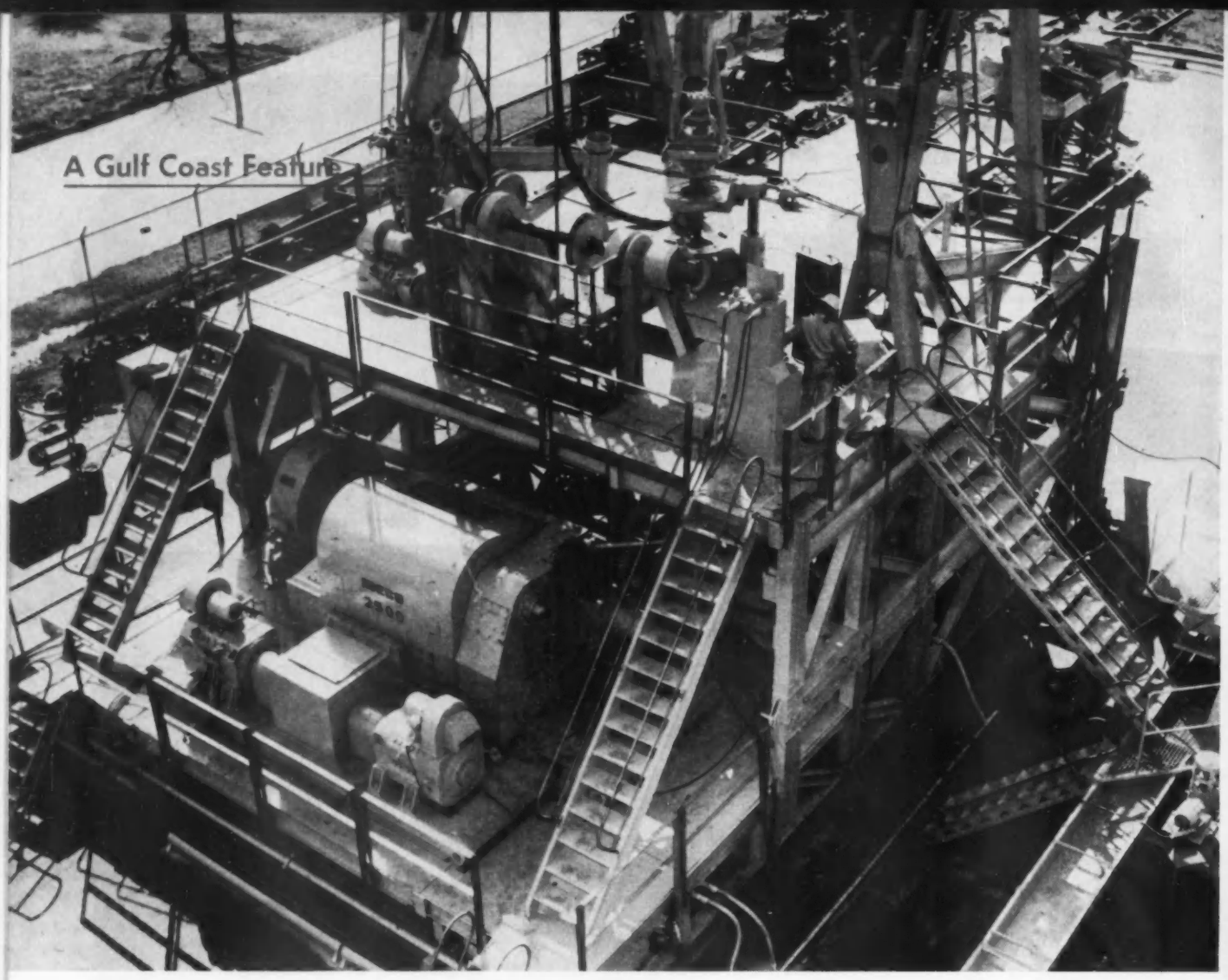
HOUSTON OIL FIELD MATERIAL COMPANY, Inc

HOUSTON, TEXAS

HOMCO Export Division
509 Madison Avenue
New York City, N. Y.

THE OIL INDUSTRY'S MOST COMPLETE SERVICE

A Gulf Coast Feature



Sun Oil Company's new diesel-electric rig as it was being assembled for test. The 2500 hp drawworks is located in a "submerged" position below the working floor. The catworks and the drillers console are located on the working floor. The fleeting sheave on the catworks shaft is used when the mast is being lowered or raised. The drawworks is placed at truck-bed height for easy rigging-up. Total weight of the drawworks without motors or wire line is 76,000 pounds. The drive for the drawworks is on a separate skid. The mechanical drive between this unit and the drawworks consists of two 1½-inch pitch sextuple width chains. The two motors provide the hoisting power. Another identical motor is on the working floor and drives the catworks and the rotary table. The table is driven through a gear box with right angle gears and then by a torque tube. Alternating current blowers are mounted on the motors to provide cooling.

Are Diesel-Electrics Moving Inland?

The use of locomotive-type traction motors is cutting the initial investment and could indicate a trend in onshore operations.

By JOHN N. SCHUELKE
WORLD OIL Staff

THE TREND toward the application of diesel-electric-driven rigs for offshore operations has resulted from the great flexibility that can be obtained with this type of equipment. The placement of the various components of drilling equipment for proper balance of the drilling structure and the greatest utilization of space is of utmost importance on offshore drilling installations. On land rigs, the trend has very definitely been toward unitized rig construction, and in the coastal areas toward large powerful rigs capable of 20,000 plus feet of depth.

Sun Oil Company recently placed in operation a large diesel-electric rig

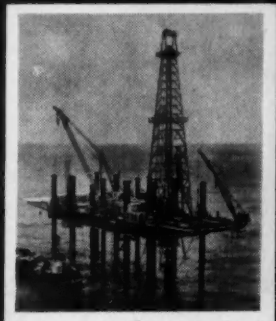
DIMETCOTE HAS REVOLUTIONIZED CORROSION CONTROL IN THE GULF

ONLY ONE COAT OF THIS 100% INORGANIC ZINC COATING "COLD GALVANIZES" STEEL TO PROVIDE MAXIMUM PROTECTION AT MINIMUM COST!

Millions of square feet of steel in offshore locations have been coated with Dimetcote since this remarkable coating was introduced in this country 5 years ago. Yet, not one properly Dimetcoted structure has shown any appreciable sign of deterioration in this time. That's a record for offshore locations! (In Australia, where Dimetcote was developed, there are structures which were coated in 1942, and are in excellent condition today, without having required any repainting for 14 years!)

DIMETCOTE IS UNIQUE! It is not a paint, yet is easily applied with conventional spray equipment. Because it bonds chemically as well as physically to the surface, it is almost impossible to find the interface between Dimetcote and the steel. Dimetcote shows no visible change after many years exposure to the most severe weather conditions—sun, heat, fresh and salt water. Unlike coatings of pure zinc, exposure to salt water actually improves its resistance. Dimetcote is insoluble in all solvents and petroleum products. It is highly abrasion resistant, but if abraded through to bare steel, the coating will cathodically inhibit corrosion. Remember, ***only one coat*** is required for years of economical protection. Dimetcote may solve your marine corrosion problem. We will be pleased to send you a product bulletin describing this protective coating, on request.

This sea-going barge is entirely protected with Dimetcote. Additional maintenance or recoating is not anticipated until sometime after 1960.



During construction, "Mr. Gus," the famous mobile drilling platform, was coated with Dimetcote. Selection of Dimetcote for this multi-million dollar structure indicates its great value for offshore locations.

Follow the line of **most** resistance

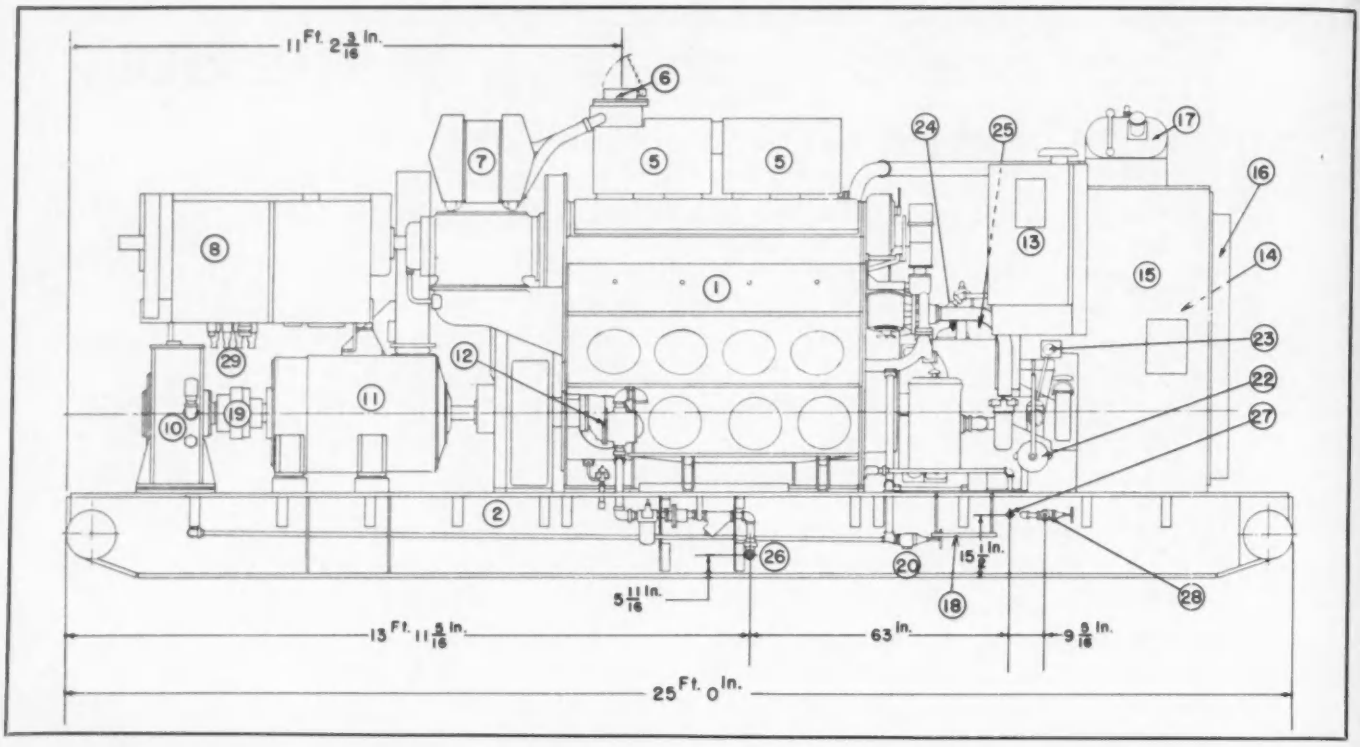
Amercoat CORPORATION

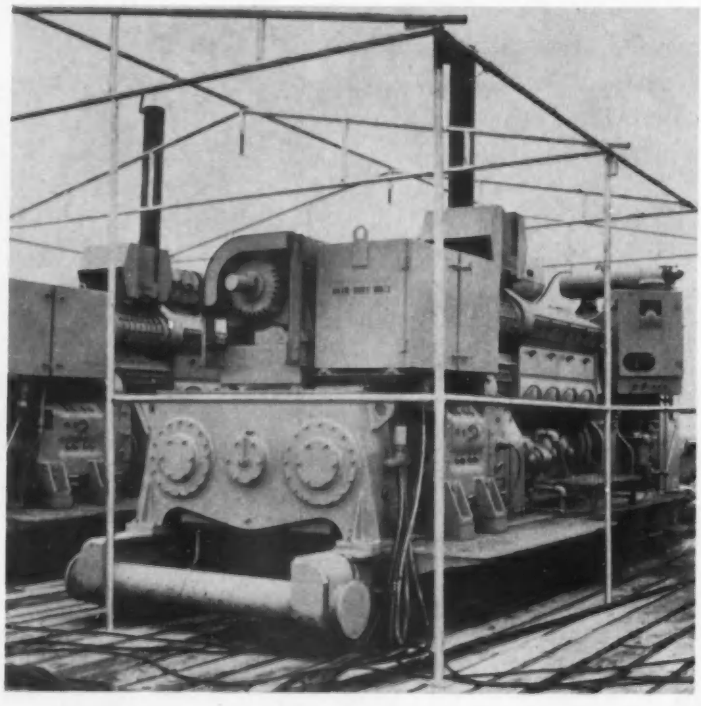
Dimetcote is highly recommended for use on: barges, off-shore drilling and production platforms, service boats, christmas trees, caissons, buoys, LTX separation units, floating roof tanks, water tanks, ship decks and stacks—any place where atmospheric or salt water corrosion is a problem.

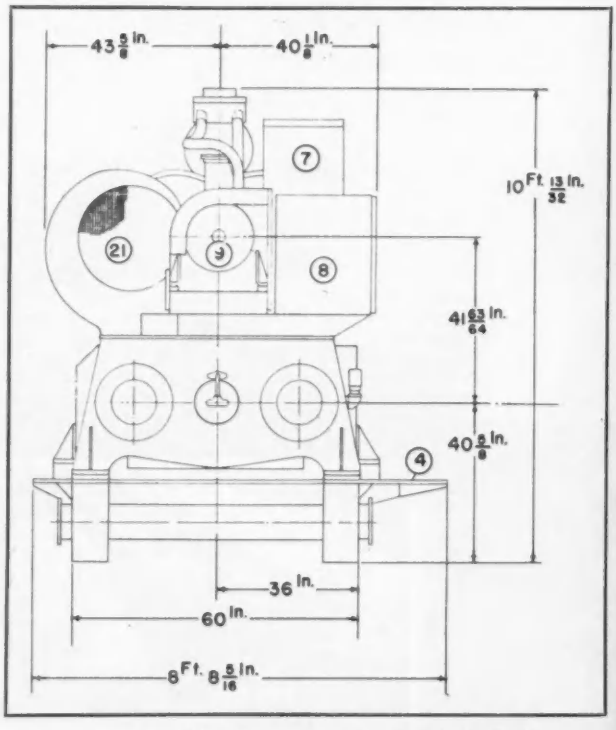
This floating roof tank was coated with Dimetcote 4 years ago to provide protection from atmospheric corrosion. Despite the severe abrasion the coating is still in excellent condition.

Dept. MF, 4809 Firestone Blvd., South Gate, California

Evanston, Ill. • Kenilworth, N. J.
Jacksonville, Fla. • Houston, Tex.

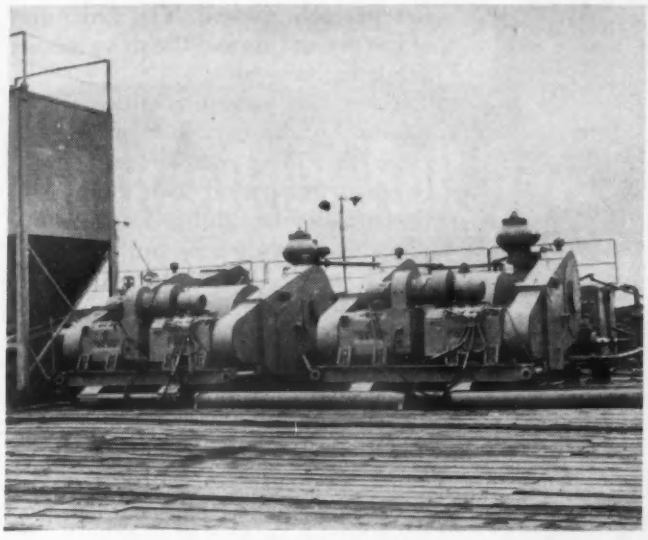


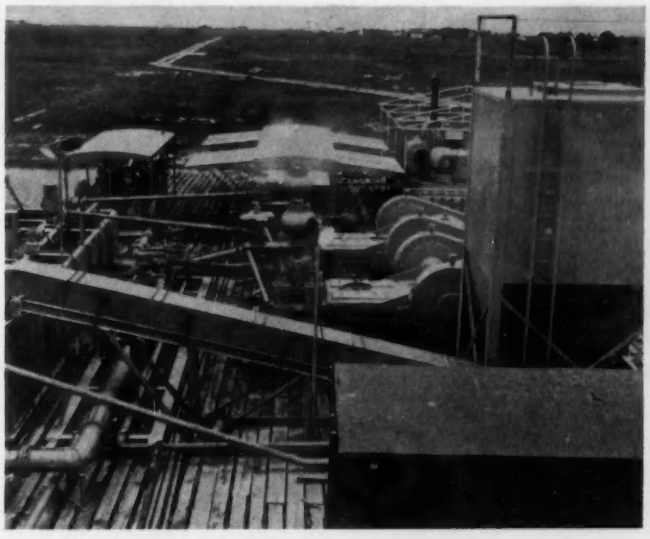




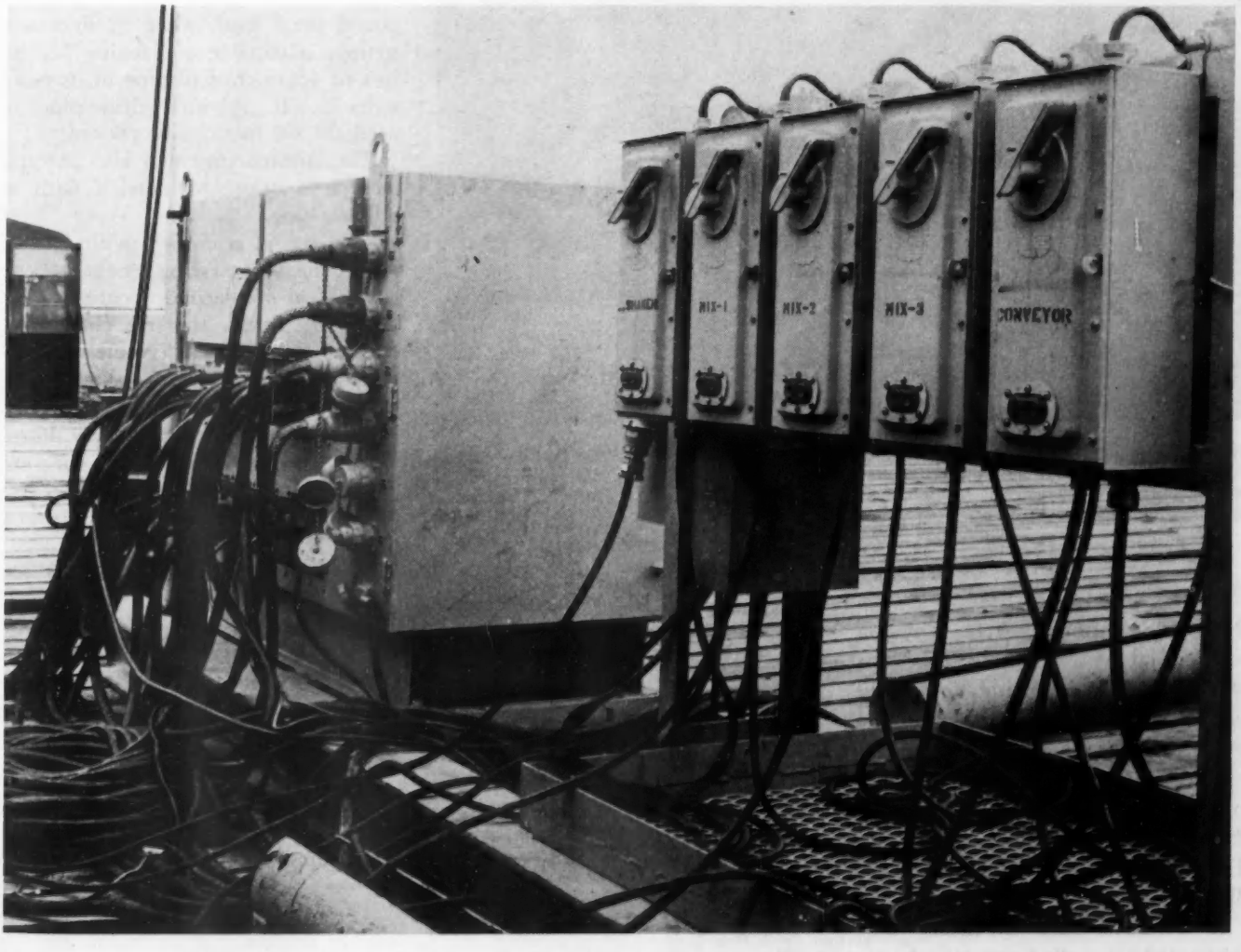
1. Engine
2. Skid
3. Engine Ramps
4. Sub-Base Ramps
5. Exhaust Mufflers
6. Rain Shield
7. Engine Air Filter
8. Electrical Cabinet
9. Exciters
10. Gear Box
11. Generators
12. Starting Motor
13. Engine Control Panel
14. Cooling Fan
15. Radiators
16. Shutters
17. Engine Water Tank
18. Fold Away Step
19. Flexible Coupling
20. Engine Water Drain
21. Generator Blower
22. Priming Pump
23. Emergency Fuel Cutoff
24. Lube Oil Filter
25. Lube Oil Cooler
26. Air Connection (1 1/2" Pipe)
27. Fuel Return Connection (3/4" Pipe)
28. Fuel Suction Connection (1" Pipe)
29. Cable Connections

One of the two, large, skid mounted, diesel-electric generating units that are rated at 875 hp at 835 rpm. These units each drive two 500 kw generators. The generators are mounted on the common engine sub-base and are gear driven from the engine. Each generator has its own exciter driven through flexible couplings from a power take-off on the engine, thereby eliminating V-belts. Separate control equipment is provided for each generator for maximum flexibility. Generator cooling is provided by an engine driven blower. The tubular framework is for canvas or metal covering for weather protection. The total weight of this generating unit is 58,000 pounds.

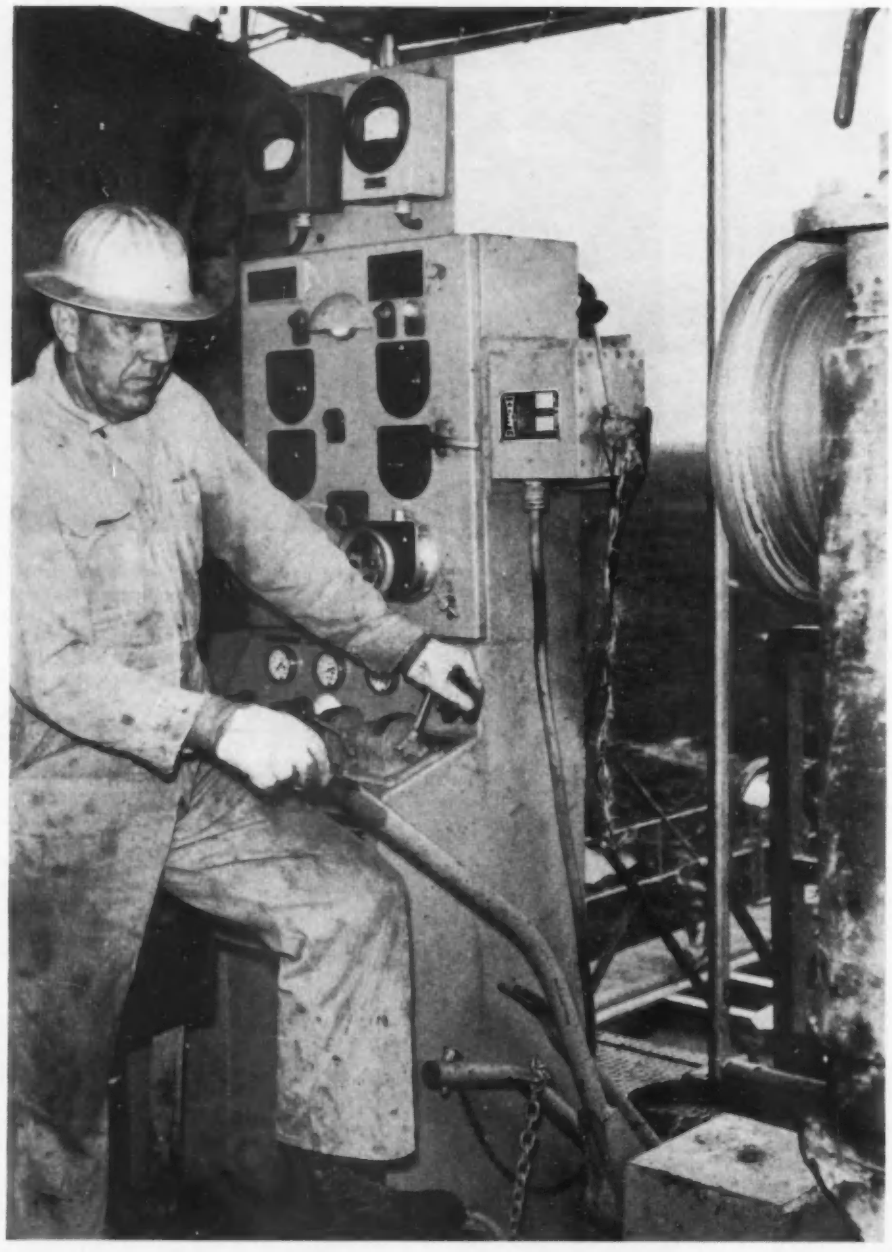




The two 7¾-inch by 18-inch mud pumps are each driven by two 625 hp series wound traction motors that are connected in series. In the front view, right, note that there is no alignment problem as the suction hoses and the discharge hoses are flexible. The pumps do not have to be aligned for power drive as the drive motors are mounted directly on the skid with the pumps. Note the electrical cables that are laid in the split pipe and are the only lines necessary to operate the pumps. At the left is the bulk mud hopper that is equipped with a covered conveyor belt for supplying dry mud to the mixing tank. Each pump skid, with motors, weighs approximately 72,000 pounds. Note that the two motors are mounted on a cross skid that can be removed from the main skid base when necessary.



This is a rear view of the main control panel. It is in a weather proof sheet metal enclosure with suitable doors on the front mounting the necessary devices for generator control, metering, and switching. Control components are standard locomotive type devices. Pneumatic contactors are provided for remote assignment of generators. AC starters are included for the blower motors and exciter set driving motors. The panel is arranged for pressurizing if desired. Note the controls for the mud system equipment on the right.



This driller's console houses the controls necessary for the direct operation of the drilling rig. It provides the controls for each motor drive, engine speed controls, and selectors for all normal switching requirements. Motor circuits are disconnected by line contactors, controlled by the driller. The table motor can be reversed by the driller by reversing the current direction through the motor fields.

capable of 16,000-foot drilling with the present prime movers. This rig has a total weight slightly in excess of 1 million pounds without the drill pipe, and 34 trucks were needed to move it.

The rig is presently equipped with two 875-horsepower diesel engines that drive four 500-kw generators. The engines have 8 cylinders with 8½-inch bore and 10-inch stroke.

A common skid mounting base fabricated of rolled structural sections provides a rigid base for the engine, generators, gear box, radiator assembly and other accessories. The total weight of each generating unit is 58,000 pounds.

The generators are gear driven at approximately 1.6 times engine speed. The engine drive to the gear box is through a torsionally flexible shaft which is designed to eliminate stress due to torsional vibrations. The generator drive from the gear box is provided with a heavy-duty flexible coupling.

The generators are identical to the drive motors with the exception of the main field windings. This winding is separately excited. The armatures of the generators and the drive motors are interchangeable.

There are seven identical drive motors on the rig rated at 625 hp each. Two drive motors are mounted on each pump skid, two more drive the drawworks, and a single motor operates the catworks and drives the rotary table. If the motors driving the table or the drawworks were to fail, they could be replaced by one of the motors from the standby pump. Or a spare motor could be carried to replace anyone of the seven that might fail. A third diesel engine, with generators, can be added when needed to enable this rig to drill to 20,000 feet.

To obtain the maximum flexibility, the control system on each engine generator set is identical.

Complete control is possible over all rig operations from the driller's control panel. Controls include audio and visual alarms for safety.

A 143 foot mast with a 750,000 pound hook load, when 12 lines are strung, is capable of racking 15,840 feet of 4½-inch drill pipe in its twin setbacks. If 3½-inch drill pipe is used, 23,300 feet can be racked.

The substructure will also accommodate a standard derrick with a 30-foot base.

The rig is equipped with a 480 ton, 6-sheave traveling block.

Now on its second location near Orchard, Texas, this rig completed its first well in the Nome, Texas, field.

This is the second rig to be placed in service using the heavy-duty, locomotive-type traction motors for onshore drilling operations.

This rig provides:

- High degree of flexibility in location of rig components.
- Flexible operation (almost any combination of torque and speed is available).
- Reduction in maintenance costs clutches, chains, V-belts, compounds etc.)
- Longer engine life due to constant speed operation.
- Savings on fuel.

These advantages should go far toward offsetting a somewhat higher initial investment in equipment and higher transportation costs.

—The End

A Smoother Roll Out with Eastman CASING ROLLERS

The most rugged, efficient, effective, and economical tool devised for rolling out casing and liners to their original gauge.

Eastman Casing Rollers are constructed of heat treated steel. Multiple rollers create a smooth rolling action that opens the casing without splitting.

For many years Eastman Casing Rollers have been available in API sizes ranging from 3 ½" to 17⅜" —

. . . AND NOW . . . A NEW 22" CASING ROLLER IS AVAILABLE FOR ROLLING OUT CONDUCTOR CASING.

For service — call the Eastman office nearest you.

DIRECTIONAL DRILLING Eastman OIL WELL SURVEYS

EASTMAN OIL WELL SURVEY COMPANY

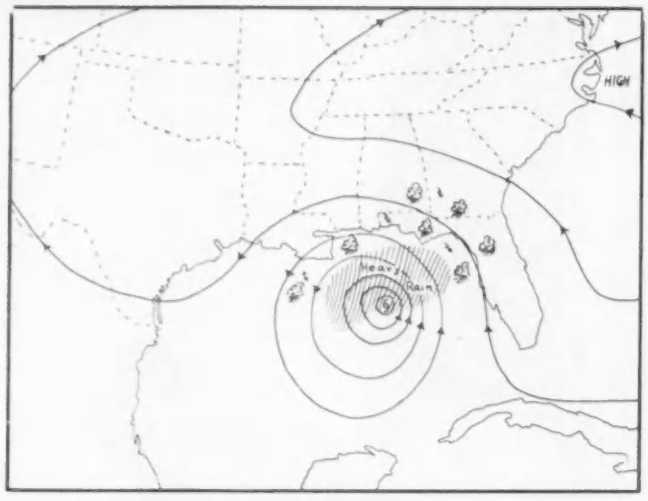
LONG BEACH • DENVER • HOUSTON

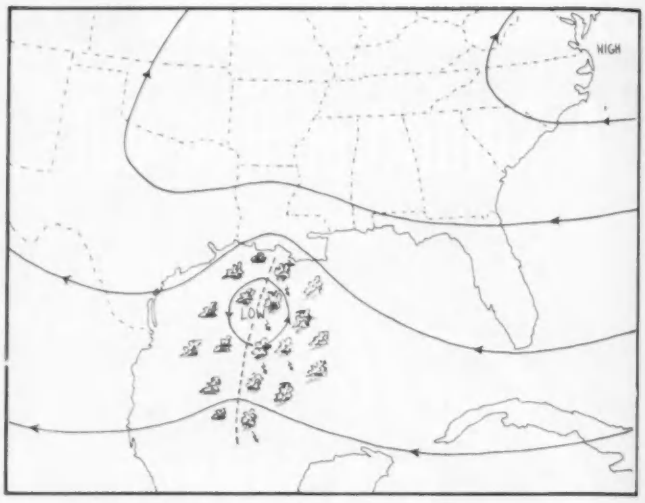
Export Sales and Service:

EASTMAN INTERNATIONAL COMPANY

P. O. Box 1500 • Denver, Colorado, U. S. A.

A Gulf Coast Feature . . .





Schematic weather map (above) of a hurricane in the Gulf of Mexico. The hurricane is located southeast of New Orleans and the area of heavy rains near the center is surrounded by squalls. The curves drawn on the map are lines of constant pressure and indicate in a general way the direction of the air flow. At right is seen a schematic weather map showing tropical squalls.

To minimize . . .

Weather Hazards in Offshore Operations

Provide . . .

- **More weather stations on offshore installations**
- **More frequent weather reporting**
- **Supervision of activities by trained meteorologists**
- **Service and supply companies with direct contact with weather warning service.**

By THOMAS F. MALONE, Director
Weather Research Center
The Travelers Insurance Companies
Hartford, Conn.

RECENT GROWTH in the scope and sheer magnitude of offshore oil operations in the Gulf of Mexico, involving exploration, drilling, and production, has brought into sharp focus the importance of weather on the safety and efficiency of these operations. It is appropriate to review the weather problem in this area with reference to these activities, to appraise the adequacy of weather reporting procedures now in use, and to consider what measures might be taken to improve the service now available and make utilization of weather information more effective.

It should be recognized at the outset that weather prediction is one of the most difficult scientific problems of our times. These difficulties arise from two sources: first, an incomplete understanding of the weather-producing processes in an almost incredibly complex atmosphere; and second, insufficient observations by which current weather conditions and trends in those conditions can be studied. Steady progress is being made toward a better understanding of weather processes. Much, however, remains to be done.

Moreover, many of the answers sought call for a more adequate observational network. The precision of weather predictions is limited to some extent by the precision with which current weather is described. This problem is especially acute in the Gulf of Mexico where there are areas of possible weather development which do not have adequate weather observations. It is a testimony to the skill and resourcefulness of the meteorologists in this region that considerable skill does exist in weather prediction in spite of these handicaps.

Those aspects of the Gulf weather problem which affect offshore oil operations are many and varied. At the risk of oversimplification, they can be divided into three broad categories:

Today, as during the past 25 years,

SSC continues to set the pace in the development

and the application of advanced exploration techniques

. . . wherever *oil must be discovered.*

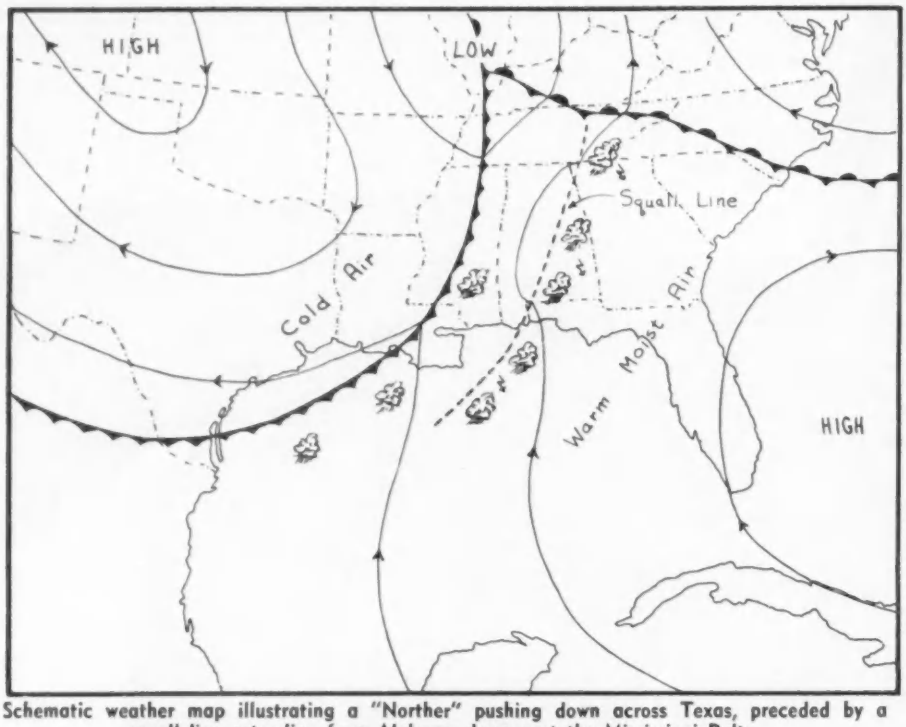
SEISMIC AND GRAVITY SURVEYS — PILOT CREWS — DIGISEIS — CONTINUOUS VELOCITY LOGGING

Seismograph Service Corporation

TULSA, OKLAHOMA, U. S. A.

WORLD-WIDE SUBSIDIARIES

SSC of Canada • SSC of Colombia • SSC of Mexico • SSC of Venezuela • SSC (Overseas) Seismograph Service Limited — England • SSC (International) • Seismograph Service Italia • Compagnie Francaise de Prospection Sismique



Schematic weather map illustrating a "Norther" pushing down across Texas, preceded by a squall line extending from Alabama down past the Mississippi Delta.

(1) hurricanes, (2) tropical squalls and line squalls, and (3) the winter type of storm, which includes the so-called northers, and the storm centers which frequently develop out over the water when cold air moves down into the Gulf of Mexico. Each of these broad classes of disturbances presents somewhat different meteorological and operational problems.

Hurricanes. For a fully-developed hurricane (a storm with winds in excess of 75 miles per hour) it is desirable to begin preparations for shutdown and evacuation of crews 48 to 72 hours before high winds and waves are expected to reach the vicinity.

When the hurricane has its origin far out in the Atlantic, it is at least possible to indicate the degree of likelihood that such a storm will affect the Gulf Coast and, where close liaison exists between operators and the meteorologist, there is no excuse for lack of adequate warning.

More serious, however, are the tropical disturbances which develop in the Gulf itself and possibly grow to full hurricane intensity. Identification is hampered seriously by lack of weather observations. Every hour lost here is of critical importance because of proximity of the nascent hurricane to offshore rigs. Even if it does not develop into full hurricane intensity and remains as a tropical disturbance, waves and tides that jeopardize safe operations can be encountered.

The most serious deficiencies here lie in the large areas of the Gulf from which no observations are available, the poor quality and lack of quantity of reports from commercial steamships, and the irregularity of observations (particularly observations of upper-level winds) from Mexico. One has only to recall some of the disasters which struck the Gulf Coast in years past, from storms which originated in the Gulf, to realize how serious this problem might be.

Tropical Squalls and Line Squalls. Tropical squalls are most prevalent during the period from June to October. Usually they appear as a mass of rather poorly organized cells, one to ten miles in diameter. Although the life-span of an individual squall is only a matter of hours, its forward motion is reasonably systematic and it can produce heavy rainfall, wind speeds in excess of 50 miles per hour, and wave heights up to 20 feet.

Occasionally a cluster of squalls will coalesce into a more or less homogeneous storm center and develop into a tropical disturbance that quickly can produce very dangerous weather.

Since tropical squalls most frequently form out over water where their detection is hampered by the difficulty of anticipating them from the conventional weather map and by the scarcity of weather observations, they present one of the most serious hazards to offshore operations.

Line squalls may occur any time of the year but are most frequent during the cooler months. As their name implies, they tend to be organized along fairly regular lines and usually occur in conjunction with or in advance of cold air moving into coastal areas from the north.

They can be anticipated from features of the conventional map, but their intensity and precise timing of their arrival are difficult to ascertain even from the usual network of weather stations over land areas. They are capable of giving rise to serious trouble because they may be accompanied by very strong and gusty winds, high waves, and brief but heavy rain.

These types of weather are extremely difficult to predict with anything like pinpoint precision more than a few hours in advance, yet they may have very serious consequences over a relatively small area. The fact that they are localized rather than widespread tends to encourage their dismissal as a problem of no great consequence.

It is quite possible, however, that cumulative losses from these storms actually may be greater than those incurred in the more spectacular but less frequent hurricanes. It is apparent from the nature of these weather phenomena that they present a special problem in the Gulf area.

Winter Type of Storm. There are two problems here. The first is to determine whether a cold front pushing down from the north will continue its southward movement or simply stall as it reaches the vicinity of the Gulf Coast. The second problem is to detect, as soon as possible, the development of cyclonic storms which originate in the western part of the Gulf of Mexico and move eastward or northeastward bringing rain, fresh to strong winds, and rough seas.

Although reasonable success has been attained in predicting this type of situation, the blind spot in weather reports out in the Gulf handicaps the forecaster, particularly in the timing of the development.

Appraisal of Present Service. Servicing of most of the offshore oil operations is a specialized operation

. . . the best thing that can happen to Tool Joint and Drill Collar Threads

LO-TORK 50% PURE METALLIC LEAD BASE

NO-GALL 50% PURE METALLIC ZINC BASE

WECO COMPOUNDS

Failure of tool joint and drill collar threads can cause enormous expenses. Since so much depends on them it is imperative that they get the finest care and treatment possible.

An important part of proper care is the consistent use of **WECO NO-GALL** or **LO-TORK.** These incomparable compounds minimize friction . . . assure maximum gall resistance. They spread easily, uniformly – never gum up or squeeze out . . . never harden. Most important: they lengthen the life of tool joint and drill collar threads . . . . reduce down time due to thread failure.

Treat your tool joint and drill collar threads to the best – **WECO NO-GALL** or **LO-TORK.** Get them from your supply store.

C-4-55

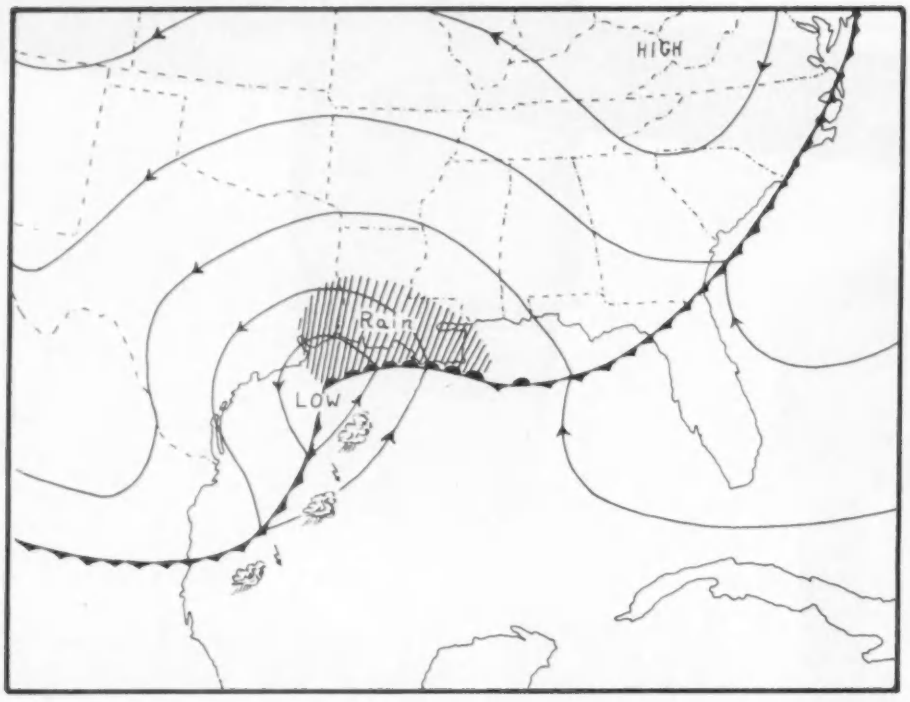
WECO®

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of*
FOOD MACHINERY AND CHEMICAL CORPORATION

PESA

fmc
FOOD MACHINERY AND CHEMICAL CORPORATION



A winter-type storm which has developed just east of Brownsville, Texas, and is now moving toward the Louisiana coast.

usually performed by private meteorologists on a consulting basis. This is a satisfactory arrangement since it permits a degree of specialization and concentration which is conducive to optimum results.

It is not in order to review here specific details of the manner in which this type of consulting service is conducted, but it is appropriate to consider several aspects of the over-all program in which improvements might be effected.

Before doing so, it should be pointed out that one of the proper functions of such a service is to be prepared to deal with what might be called extraordinary weather, that is, weather developments which are so unusual that they happen only rarely, but so violent when they do occur that, if entirely unexpected, they might prove to be catastrophic in their effects on such a weather sensitive activity as offshore oil operations.

Thus, for example, while no tropical squall or line squall can be dismissed lightly, many of them present no more serious a problem than temporary interruption of operations. True, one of the functions of a first-rate weather service is to reduce to a minimum the economic losses of such interruptions. However, every now and then a tropical squall or a line squall of unusual severity will come along. If it should prove to be near catastrophic in nature, it is small comfort to know that it was a freak which could not be anticipated with the equipment and facilities which are more or less adequate for routine weather disturbances.

Extraordinary measures are required for extraordinary weather. When the possibilities of heavy losses from such weather occurrences exist, it is sound economy to provide facilities which give promise of holding such losses to a minimum even if these facilities appear to fulfill only a standby role during normal weather conditions.

With the dual objectives in mind of providing the best possible protection against extraordinary weather and insuring most economical operation during ordinary bad weather, the general weather program in the Gulf area as it pertains to offshore operations can be appraised to determine whether or not extensions are required or improvements can be effected.

The most obvious and potentially the best tool that should be incorporated into this program is weather radar equipment. It is almost unthinkable that weather analysis and forecasting in this area should be carried on without this equipment.

It would be absurd to maintain that all weather problems can be solved simply by installing one or more radar sets. Yet, as a single instrument which is capable of providing a continuous and instantaneous representation of the more troublesome disturbances of Gulf weather, tropical squalls and line squalls, radar has much to recommend itself.

The clouds of raindrops almost always associated with these local storms show up as echoes on a radarscope. Exact location of these echoes can be determined and their progress toward a given point measured. Very frequently their future path can be anticipated correctly.

Radar used for this purpose has its most effective range between 100 and 150 miles. This, of course, limits the period of time for which advance warnings can be supplied, but even a two to six-hour warning could well prove to be invaluable in taking necessary precautions on offshore rigs.

Enough experience has been had with radar to obtain useful approximate relations between the speed and duration of winds and the movement, size, and duration of the echoes. This is the kind of information that needs to be developed in detail for application to wind and wave forecasting along the coastal waters of the Gulf.

To be of greatest value, the weather radar system required to fill the deficiency that exists in the present service should be operated and controlled by the consultant meteorologist.

The second major need that is recognized in the present meteorological program is for more weather observations and more frequent observations from rigs now located out in the Gulf. The possibility of installing a network of so-called automatic weather stations at a number of offshore rigs should be considered.

These stations would automatically measure such quantities as barometric pressure, temperature, wind speed and direction, relative humidity, precipitation, and light from the sky, and transmit this information via radio at three or six-hour intervals during the day.

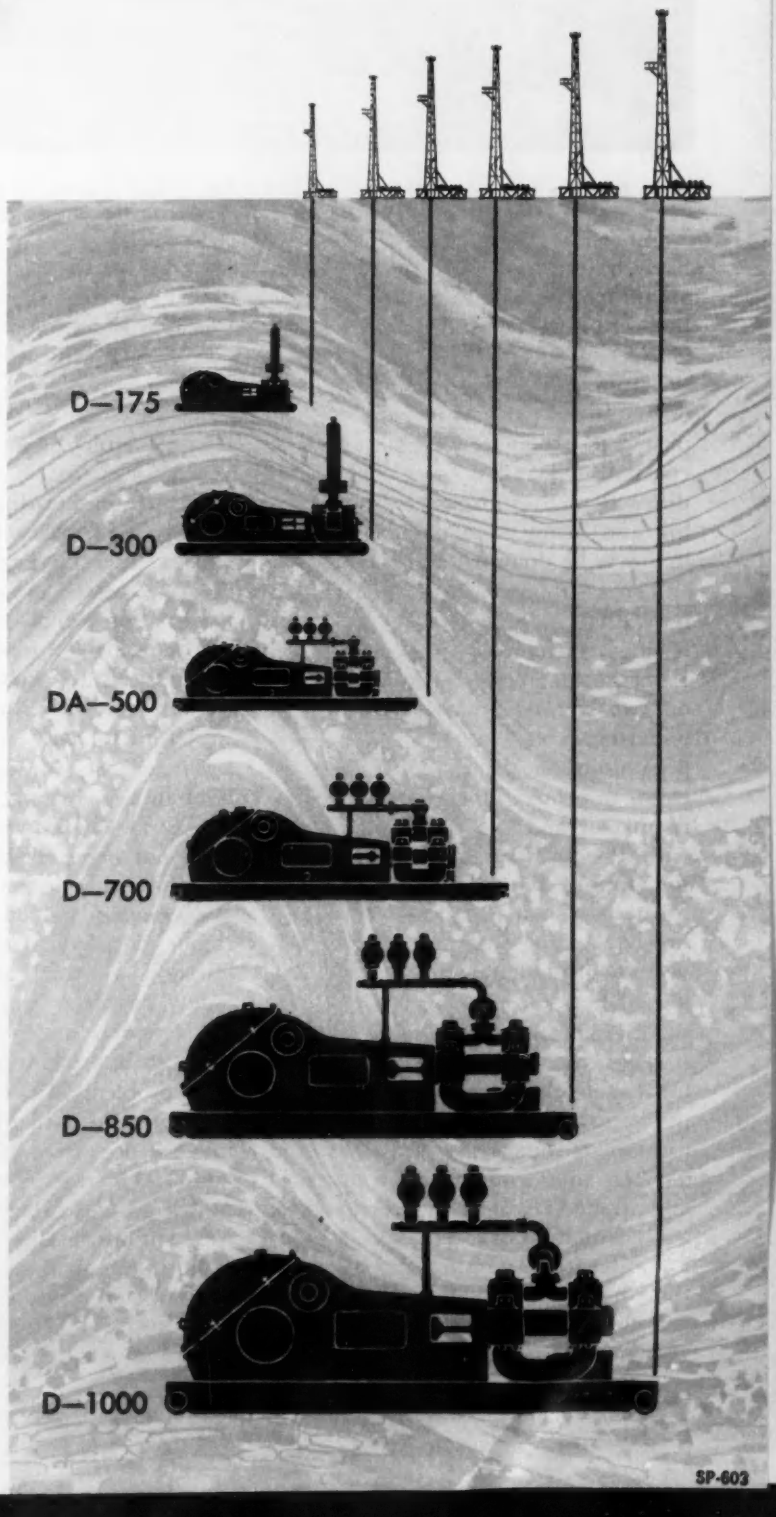
Developments in measuring systems, telemetering, and radio transmission in recent years have been such that the major problems involved in such an installation largely have been solved. The possibility of incorporating automatic measurement of wave heights merits study.

A network of automatic weather stations would complement rather than duplicate the weather radar system. Such a network would very

SLUSH PUMPS

deliver more horsepower per pound with greater economy

Built to stand up for long service under tough conditions with low upkeep!



Here is Why:

Precision-Built Herringbone Gears

Wide-faced, forged steel, heat-treated herringbone gears provide quiet and efficient speed reduction. Ring gear is bolted to eccentric hub, thus permitting economical replacement. Pinion and pinion shaft are forged as one piece from heat treated alloy steel.

Cast Steel Fluid End

The 8-pot fluid end is composed of steel castings, electrically welded into a single unit. Each valve is located in a separate pot or valve chamber.

Heavy Duty Power End Frame

Fabriform construction originated by Emsco utilizes steel plates and shapes in place of bulky, heavy iron castings and provides a rigid and lightweight frame.

Positive, Automatic Lubrication

No greasing or adjustments are necessary. Lubrication is completely automatic.

Patented "Exposed" Liner Design

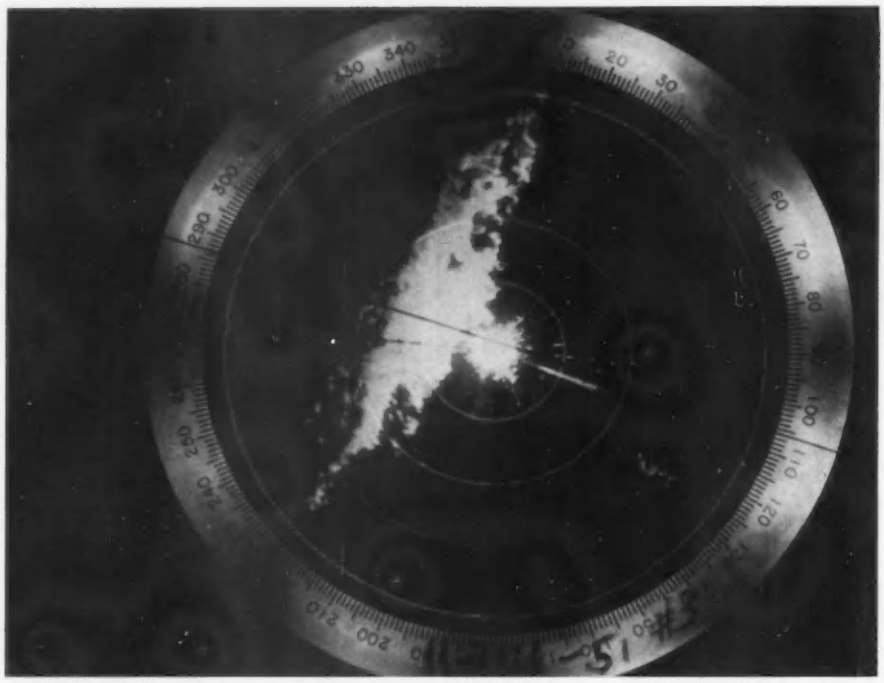
The Emsco patented "exposed" liner construction eliminates all fluid end "washouts" caused by liner packing failures. Liners are packed at both ends and are completely exposed to view.

Distributors

Bovaird Supply Company, Tulsa, Oklahoma

Mid-Continent Supply Company, Fort Worth, Texas

Export Distributor: Mid-Continent Supply Co., Inc.
45 Rockefeller Plaza, New York 20, N.Y.



Shown here is a radarscope. The line of patchy white echoes is produced by reflections of the radar signal from masses of raindrops in the atmosphere.

likely be the most economical way to obtain badly needed weather observations over the coastal waters of the Gulf.

Setting up a reasonably complete observational program can be expected to produce best results only if concentrated and sustained efforts be directed to the problem of interpreting and using these data. Much remains to be done in this regard.

The weather forecast centers should be staffed 24 hours a day with professional meteorologists. Not to do so is open to the charge of false economy on two counts. First, it leads to an understandable tendency to be overpessimistic on the part of the forecaster to protect himself only when he is on call and not in direct contact with the weather data coming into the station. This dilutes the value of forecasts of bad weather. Secondly, it involves taking some risk on the development of significant weather during off-hours.

Provision should be made on the staff of the private weather service for a research meterologist who would not be involved directly with the daily routine of forecasting, and so would be free to devote time to practical and applied research on interpretation and correlation of radar reports, automatic weather station data, and regular weather observations.

There is a rich field of operations research to be exploited in relating the odds for the occurrences of a particular weather event to operational decisions which must be faced if these odds exceed critical limits.

There is a need in the present program for closer collaboration between the meteorologist and the companies which must make decisions on the basis of weather forecasts. Too frequently the forecaster is asked to give only a brief categorical statement about expected weather. Additional information which might have a direct bearing on operations often is not utilized because the forecaster does not know the precise purpose for which the forecast is desired.

In general, routine procedures to be followed by the operating companies for given weather conditions have not been established. That this is possible has been demonstrated by one company which has prepared a rather detailed program to be followed if a hurricane is forecast. Safety engineers working closer with the research meteorologist could do much to improve this situation.

A problem also exists in the frequent use of weather reports that come into the possession of the user secondhand. This happens when a non-subscriber to a weather service monitors weather information disseminated by radio to a regular subscriber and then applies the information to his own operation. This inevitably results in failure to extract the full worth of the service the meteorologist is able to provide, and may give rise to the misuse of weather forecasts.

The hurricane problem cannot be attacked so directly. Here, too, the requirements are twofold: Observations and research. As already noted, the quality of reports from ships in the Gulf leaves much to be desired, as does upper-air data from Mexico. These matters are properly the concern of the U. S. Weather Bureau. The proposed Weather Bureau long-range radar stations on the Mississippi Delta and at Brownsville will assist in this matter. The plans to locate a weather ship in the western Gulf are encouraging, but too much help should not be expected from a single, small ship which naturally cannot be on station continuously.

Summary of Recommendations. It is recommended that:

1. One or more weather radar sets should be installed in the areas of high density of offshore work to be used exclusively for prediction for these operations. This is almost essential for properly dealing with the most troublesome type of weather in the Gulf area. The information from these sets should be directly and immediately available to the private firms servicing the operating companies.

2. Frequency of regular weather reports from offshore rigs should be stepped up to at least four per day. The feasibility of setting up automatic weather observing stations on a network of rigs should be seriously studied.

3. Service provided by private firms should be expanded to provide 24-hour attendance by professional meteorologists. Provision should be made for an especially qualified research meteorologist who would devote part of his time to meteorological investigations and the balance of his time to working directly with the safety engineers and operating personnel of the oil companies.

4. Companies that are involved in extensive offshore operations servicing the oil companies should have direct contact with the weather service.

5. Continued support and encouragement should be given to the U. S. Weather Bureau in its observational program for detecting hurricanes and its research program for improving the prediction of the movement of hurricanes. —**The End**

GUIBERSON TUBING SWAB

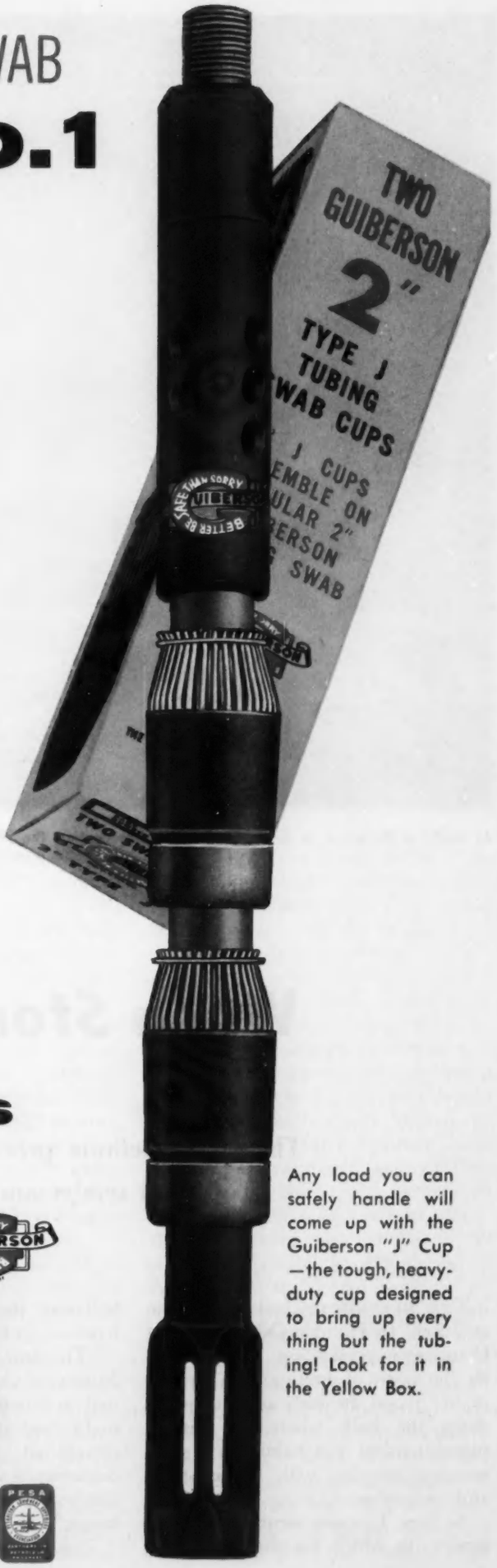
world's no.1 swab

Because it

gives you more efficiency and reliability – more for your money

Because

we manufacture our swab cups in our own rubber plant – from our own carefully compounded synthetic rubber formulas



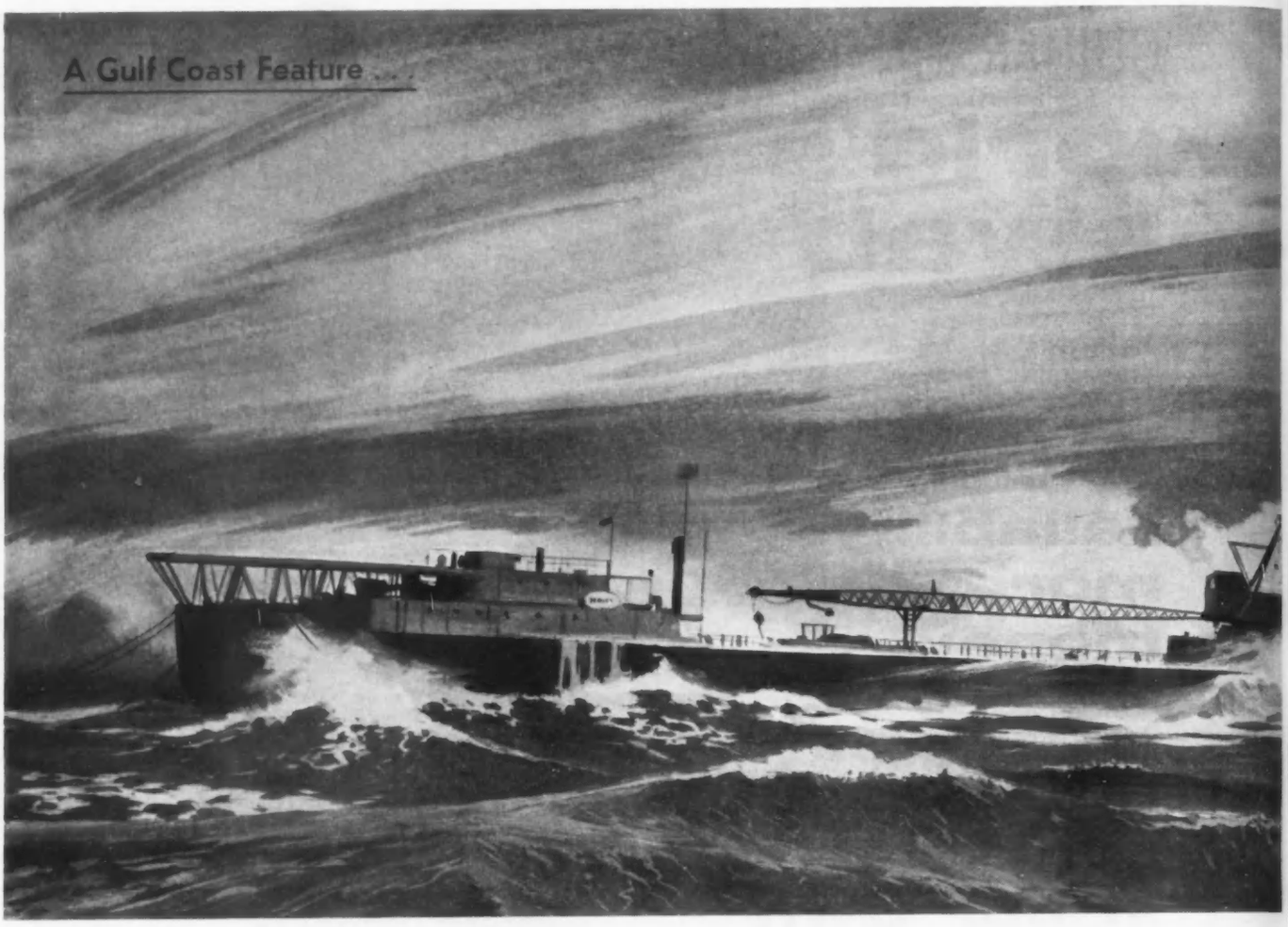
Any load you can safely handle will come up with the Guiberson "J" Cup —the tough, heavy-duty cup designed to bring up every thing but the tubing! Look for it in the Yellow Box.

THE GUIBERSON CORPORATION

ESTABLISHED 1919 • DALLAS, TEXAS, U. S. A.

Sold By Leading Oil Field Supply Stores Everywhere

A Gulf Coast Feature . . .



At height of the storm, as shown in this artist's conception, the ST rides safely at its moorings; all operations have halted, equipment has been secured, and personnel moved ashore.

When Storms Threaten

There is a definite procedure for securing the platform and tender and evacuating the crews.

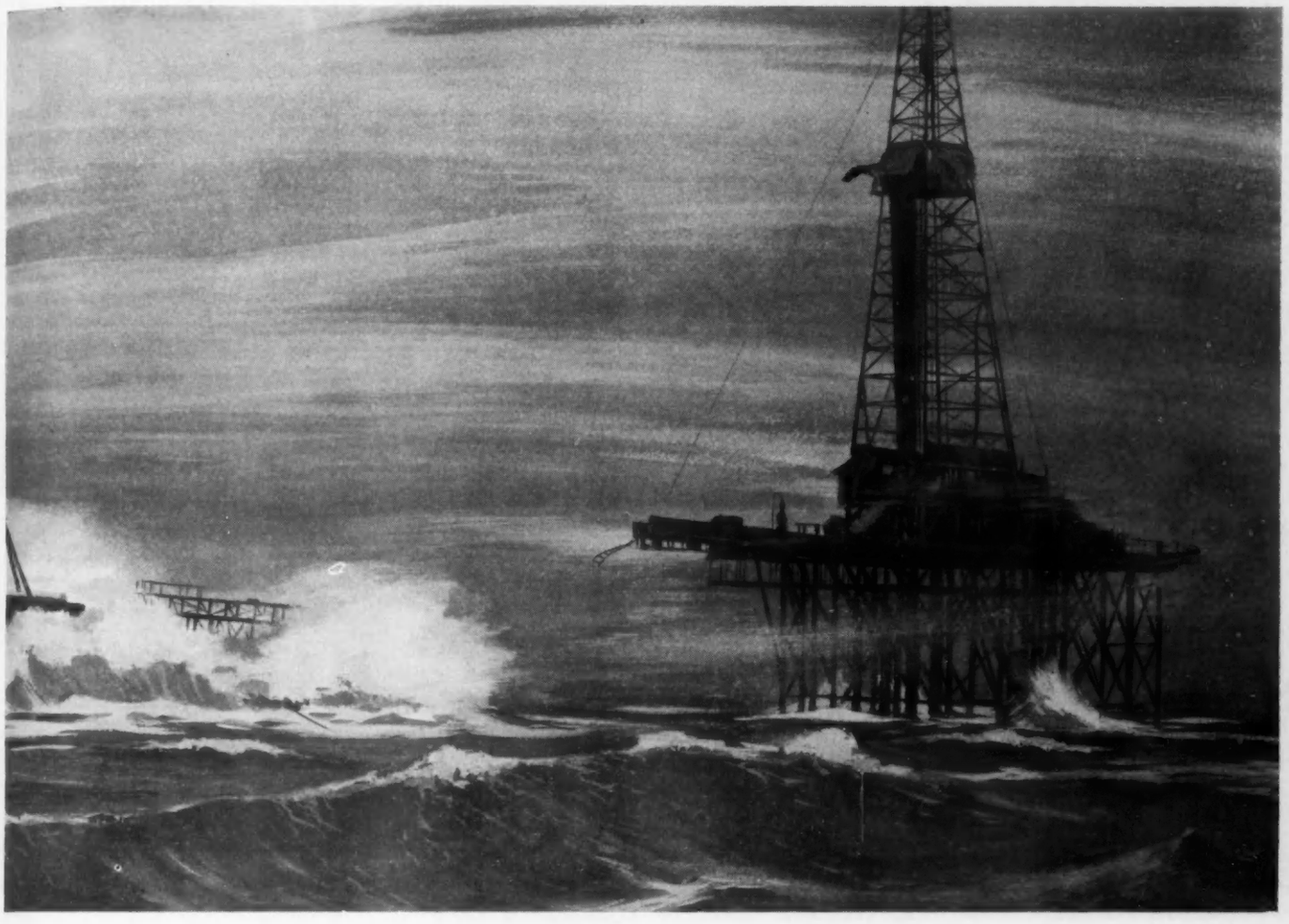
THE MESSAGE reached Grand Isle at 7 a.m. In Humble Oil & Refining Company's production headquarters on the coast of Louisiana, a stenographer typed the data and hurried it down the hall, where the district superintendent was holding a regular morning meeting with his assistants and toolpushers.

A New Orleans weather advisory service, to which Humble subscribes, had sent the message. The superintendent read:

"The low pressure area over the Northeast Gulf yesterday has continued to intensify gradually during the night. A rotating wind system has been established. It is possible that this disturbance will intensify into a tropical storm during the next 36 to 48 hours."

The men grouped around the desk showed no surprise, no excitement. It was hurricane season. Storms were to be expected. Here was just another of the many operational problems involved in finding and producing oil in the Gulf of Mexico.

If this particular storm were unusual, it was because it was born inside the Gulf—probably no more than 300 miles out. Most hurricanes, spawned far to the southeast in the Caribbean,



have small chance of catching Humble's offshore operations off guard. For by the time such hurricanes enter the Gulf, they have long since been pin-pointed, analyzed and prepared for. The storm which makes up close to home gets the sharpest weather eye from Grand Isle personnel. This was such a storm.

When the meeting broke up and the toolpushers rode helicopters to their drilling tenders, the ships were already pitching in moderately rough seas. This was a storm that might never materialize. The center of the disturbance was not yet located. But it was clear that the blow was making up close to home, and some rough weather was in store at best.

The toolpusher—any toolpusher in the Gulf off Grand Isle that day—prepared immediately to secure all cargo, cover the ship's hatch, and close necessary water-tight doors.

Long before an immediate storm threat hung over the Gulf, the toolpusher and his men had started preparing for just such an emergency. From the start of the hurricane season, they keep their business in shape so that they can suspend operations and, if necessary, evacuate all personnel with a minimum of lost time.

At 9:30 a.m. that day the toolpusher took a call by radio telephone from headquarters on Grand Isle. Another advisory had come in:

"Ship reports indicate that disturbance has intensified to small tropical storm. Upper atmosphere conditions are very favorable for intensification of storm. It is possible that disturbance may intensify to small hurricane causing 50 to 80 mph winds along Coastal Louisiana late tonight. Resulting swells would be 15 to 25 feet in height."

Center of the storm was still in doubt at this time, but it was thought to be not much more than 100 miles south southeast of Grand Isle.

Closing of the hatch amidships requires about three hours and is done with the aid of a 35-ton crane. Operation of the crane is restricted after waves reach five to eight feet. So the job must begin early.

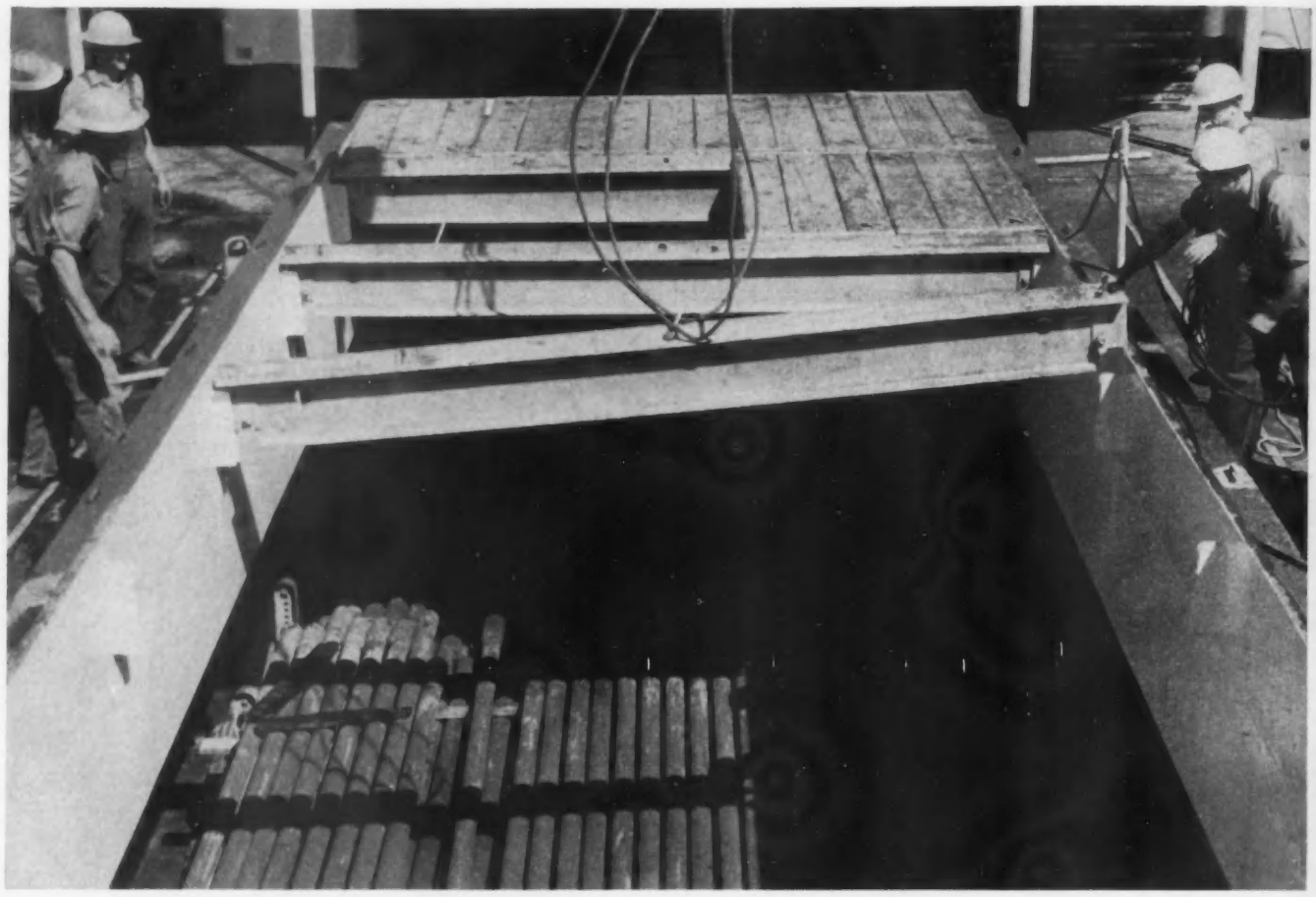
Steel beams are hoisted into position across the hatch. Then hatch covers are fitted betwen the beams. The pusher gave orders to cover the hatch about three-fourths over, then hold off, so drilling mud or pipe could be lowered through the hatch.

Another advisory came at 1 p.m.:

"Tropical storm located at 12 noon about 120 miles south southeast of Burwood, Louisiana (about 40 miles east of Grand Isle on the coast) and is stationary. Forecasted movement from 12 noon to 6 p.m., west northwest at 10 mph. Ship located 40 miles south of center reported squall with 55 mph wind and rapidly falling barometer at 11:30 a.m. Winds 40 mph extend 100 miles north of center. Winds expected to increase to 50 mph with possibility of gusts to 80 mph and 15 to 25 foot swells at exposed locations on southeast Louisiana coast tonight."

If the storm continued along its forecasted course, Grand Isle would feel the worst of the blow. So little doubt was left that operations would have to be shut down and personnel evacuated until the storm had passed.

Attention now was turned to preparing the rig. The driller pulled his bit back up into the casing. Drill



Closing the main hatch in preparation for a storm is a three-hour job. A 35-ton steel crane must hoist the steel beams into position across the hatch. Hatch covers are then fitted between the beams.

Casing, racked on the deck of the ST, is securely lashed down with strong cables as storm approaches the area; all crew members will go ashore to wait out the storm.

pipe coming out of the hole was racked and lashed in the derrick. Blowout preventers, as well as a big four-inch valve on top of the drill pipe, were closed. All drilling lines were made fast, and the rig cleared of personnel. The platform it rests on was built to withstand wind and waves of maximum force.

The offshore operations area around Grand Isle was now buzzing. Converted Coast Guard cutters, or AC's had long since plowed out in the Gulf to tow in bulky oil barges from producing wells, all of which had been shut in. Helicopters were evacuating personnel except those needed in the shut-down operation; they would be picked up later by the AC's.

Wives of Humble employes on the island rounded up children and saw that all belongings in their two story homes were stored upstairs.

Company families were given the opportunity to move into New Orleans or some other inland city during the storm. Few went, and these only because they had business inland and didn't wish to be caught on

the island and miss an appointment. Most had ridden out hurricanes before on Grand Isle. All have a great respect for tropical storms.

On the ST, the toolpusher now completed covering his hatch. Seas were already up to about eight feet. Time, then, to raise the bow ramp—the "bridge" which crewmen use to cross from ship to drilling platform A snaking winch on the back of the platform, rigged with lines over the derrick and back down to the ramp, lifts the ramp up and clear of the ship. This done, the men cross from ship to ramp on a jacob's ladder, wearing life jackets.

Advisory, received 4:10 p.m.:

"Storm located about 115 miles south southeast of burwood and moving west northwest at 10 mph. Maximum winds 40 mph but ships in storm report 55 mph winds. Disturbance expected to intensify . . . causing wind, sea and tide conditions described in previous advisories. Winds over lower Mississippi Delta now 45 mph with squalls and eight to 10-foot easterly swells at exposed locations."

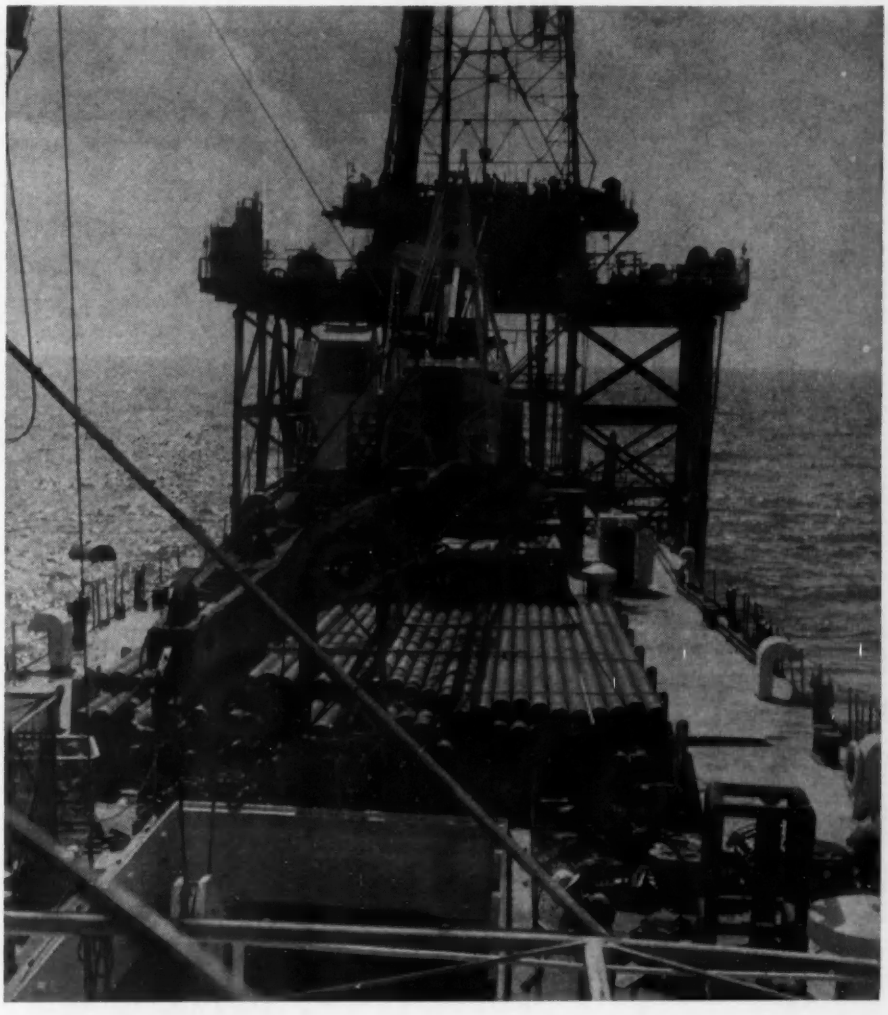
All connections now between ship and drilling platforms were disconnected, but storm preparations weere not complete. The ST must now be pulled back, at least the distance of the derrick's height, to ride out the storm.

An ST has no propellors, but it can be maneuvered by means of its mooring winches. A Humble ST has four such winches forward and four aft, equipped with heavy anchor chains attached to spud piles driven in the ocean floor. By slacking off on one set of chains, then, and pulling on the other four, the ship can be moved away from the platform. Once back, she must be maneuvered with the winches to head her bow into the wind.

Now men began to leave the ST. Those who hadn't left earlier in helicopters were transferred to an AC, a sturdy converted Coast Guard cutter which can weather almost any blow.

The toolpusher is always the last to leave the ST. With one of the ship's crew, he took a last tour of the ship. Are all the blowers below deck shut down? Any vents to topside left unplugged?

It was long after dark that the tool pusher and his engineers secured the last door and went aboard the pitching AC. So now the platform and the ship were evacuated, and all crewmen were on the way in to wait out the storm ashore.



After the hatch has been secured, the crane would be secured in this position in preparation for a storm. The ST would be backed off at least a derrick length from the platform and ride out the storm at anchor.

Advisory, received 9:30 p.m.:

"Tropical storm located at 9 p.m. about 95 miles south of Burwood and moving west northwest 10 mph. Maximum winds reported by Navy plane in storm center at 60 mph. Conditions previously outlined expected to develop."

So Grand Isle personnel turned in that night with a storm almost in their laps. But they could feel satisfied with the day's work. Not a man was left out in the Gulf. All was battened down and secured. Not a job was left undone.

Whether the night was an anticlimax is a matter of opinion. Some rough winds and waves raked the island that night and the following day, but the storm never reached hurricane force. As the early morning weather advisory disclosed on August 1, the storm—with maximum winds of about 55 miles an hour—veered northward when it approached shore, passed almost directly over Burwood to the east and blew itself to death across the mainland. Nobody was hurt; no appreciable damage was done. Grand Isle had weathered another storm.

Advisory, received 7 p.m., August 1:

"Center of disturbance is now inland and weakening. Wind and swells expected to commence decreasing tonight on southeastern Louisiana coast. Advisory will be discontinued . . ."

And by August 2—just 48 hours after the first storm advisory was issued—producing wells were flowing again, ST's were manned once more and rigs were back to drilling off Grand Isle.

ACKNOWLEDGMENT

This article appeared in the January-February, 1956, issue of the *Humble Way* under the title of "Storm at Grand Isle."

A Gulf Coast Feature . . .

Directional Drilling for Salt Dome Oil Production

Two basic methods are presented for drilling piercement type salt domes, while the constant angle, on-course method has proved best for deep seated dome development.

By K. R. JOYNT and A. H. MASSAD
Magnolia Petroleum Company
Morgan City, La.

DIRECTIONAL drilling has become a technique of development rather than a remedial operation in the development of oil fields in the Gulf of Mexico. Two basic methods of directional drilling are used in exploration and development work on deep seated and piercement type salt domes. A choice of the method used is dependent upon the following basic factors:

- Consideration of the geological structure and information.
- Location of the target in respect to platform and surface location.
- Correlation of the target point and the casing program.
- Well density and spacing requirements.
- Mechanical limitations of equipment.

The most common tool for obtaining deflection in a deviated hole is the retrievable whipstock. This tool is used with survey instruments to retain control over the deflection angle and the direction of the hole.

As concerned here, directional drilling relates to the "practice of controlled angle-deviation from vertical in any well bore." A directionally drilled well is not a crooked hole, but is a directed well wherein all bends are controlled to stay within safe limits. This control is brought about by the use of various tools to induce the deviation, followed by survey instruments which record the deviation and its direction from the surface location.

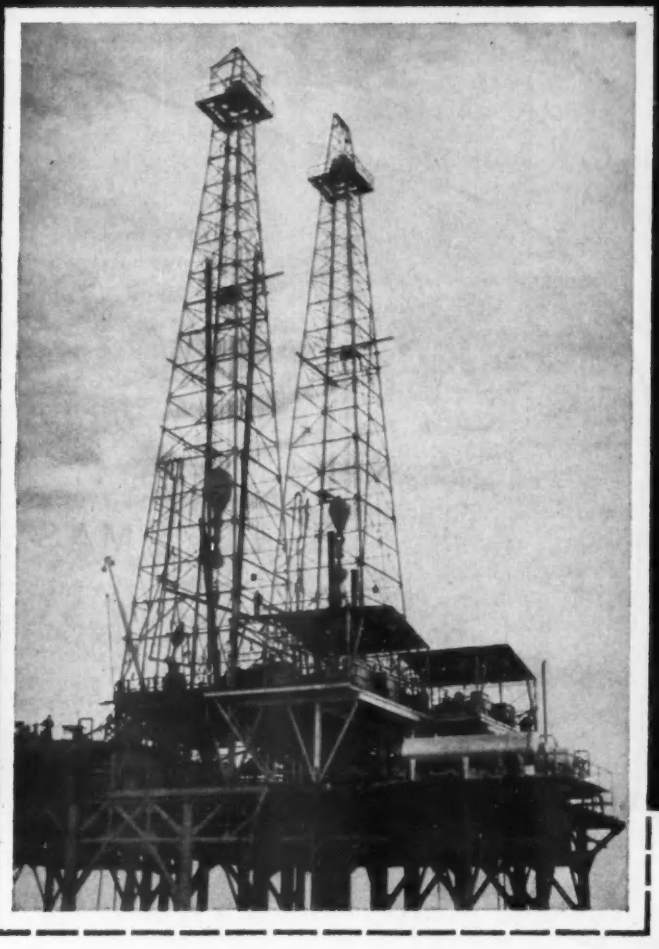
Probably the first directional drilling ever undertaken was to sidetrack tools lost in a well. When the driller considered a bit to be irretrievably lost, he would cut down a tree of slightly smaller diameter than the hole he was drilling. Then, starting at the top of this log, he cut a long, tapered face on one side. This crude whipstock was forced down the hole until it lodged on top of the fish. He then ran the tools back into the hole and drilled carefully, until he had sidetracked the lost equipment. Ancient as it may seem, this practice is still used by many water well drillers today. However, directional drilling has progressed considerably in the past years, and now, operators, with the assistance of service companies, are able to achieve what had once been termed impossible.

Until the development of oil fields in the Gulf of Mexico, the principal area for directional drilling was the West Coast. True, the practice had been used in drilling relief wells for blowout control, sidetracking tools in a hole, or for other similar reasons; but, little consideration was given to the technique as a development tool until the economics of platform installations were analyzed. Today, southern Louisiana is a veritable boom area for directional drilling activities.

The ultimate consideration in any operation is to be able to produce more oil at less cost. It therefore follows that, to be able to accomplish this, economic evaluation must be made of each and every related phase of the operation. Consider first, a location in the tidelands from zero to two miles offshore. Here the economics of locating a rig on land and drilling a deviated hole to a target offshore could be evaluated against the use of a submersible barge, or a platform, and the drilling of a straight hole. In areas further away from land, it becomes obvious that either a platform or a submersible barge must be used. At the present time, a choice must be made between these two. However, further flexibility is possible in the selection of a tendered-type or a self-contained platform. The number of wells to be drilled from a platform is considered to be a function of the type of reservoir being developed. The over-all economic picture highly favors the multi-well platform with several controlled-deviated holes.

It is noted that, as of this date, there have been no artificially created islands used in the Gulf of Mexico which resemble those used in the California offshore oil fields.

Deviation Methods. Directional wells are of two general types. They are classified here by the "target approach" method. These are:



offshore products

built by Avondale

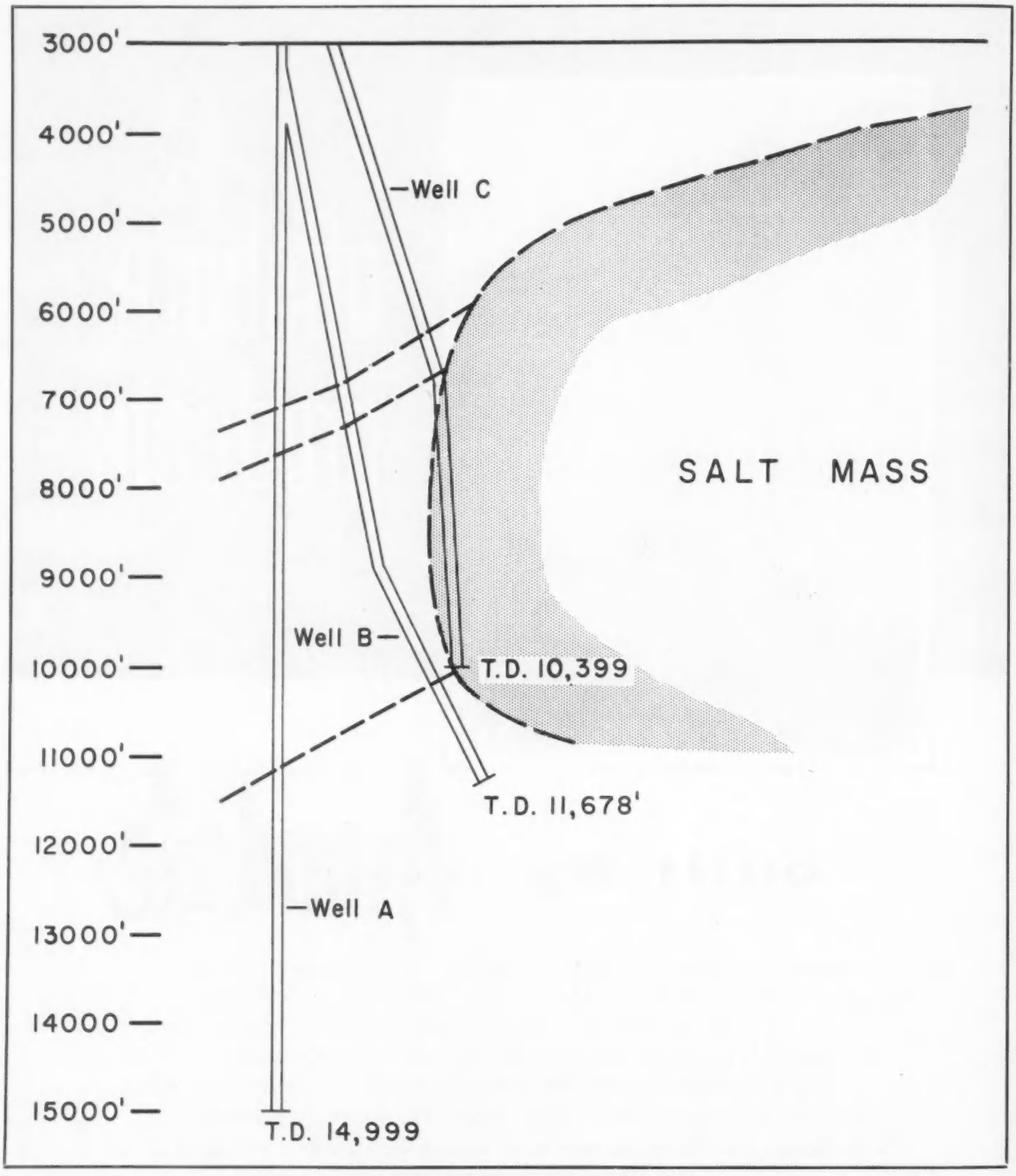
Offshore structures of all types . . . barges, towboats, tugboats, personnel launches, and many other types of equipment for the Oil Industry.

Yes, Avondale has built them all—fabricated them, repaired them. Avondale-built equipment pioneered the search for oil in the waters of the Gulf of Mexico; and Avondale-built equipment is everywhere today, doing a job for oil companies and drilling contractors. Avondale's products for the Oil Industry are known throughout the world—their design, workmanship and dependability unsurpassed.

SHIP BUILDING • SHIP REPAIRING • FOUNDERS • PROPELLERS • STRUCTURAL STEEL

AVONDALE MARINE WAYS, INC. CABLE ADDRESS "AVONWAYS"

P.O. BOX 1030 • PHONE UNiversity 6-4561 • NEW ORLEANS 8, U.S.A.



Here is a drawing showing the first well (A) drilled as a straight hole. Well B is then kicked in to test up-dip formation, and Well C shows controlled deviation until the horizontal distance is reached, and the hole is drilled vertically to the pay.

- The drift angle is increased at a constant rate to the desired maximum deflection angle, which is then maintained until the target or oil zone is reached, or,
- The drift angle is increased at a uniform rate and maintained until the desired lateral displacement is obtained, at which point the well is brought back to vertical at a uniform rate of decrease in angle. Drilling may then continue from this point in a vertical hole.

Advantages and disadvantages of the two types are many. The first type of well is generally easier and less expensive to drill. If desired, the oil zone could be penetrated at an angle, increasing exposure of sand in the producing zone. The second type is used where deeper horizons are to

be explored or in drilling a well which is to be bottomed very near a lease boundary or around piercement type salt domes. Since the straightening procedure in the deeper portion of the well is often a slow process, this type of well generally is slightly more expensive. Selection of the method used must of course depend on the situation.

Selection of Method. Various factors should be considered when selecting a deviation method. The final decision is based on economics—actual dollars—but a thorough review should be made of each of the factors mentioned in the opening paragraph.

Briefly reviewing these factors, the geological structure is of prime importance. This is especially true in the drilling of piercement type salt domes, where the salt overhang must be penetrated in the shortest time. Method No. 2 is utilized to eliminate the drilling of a salt overhang whenever possible.

The location of the target with respect to the platform or surface location must be considered because of the lateral displacement involved. This factor is associated very closely with the correlation of the target point and casing program. It is recognized that the casing program must be planned to fulfill the needs of expected formation conditions and provide adequate protection for the deviated hole.

The well density and spacing requirement are mentioned because of their high degree of importance in shallow sand development. These wells naturally are developed on closer spacing than the deep holes. The problem then becomes one of utilizing both deviation methods to prevent the intersection of any two well bores.

The last factor is the mechanical limitation of equipment. This refers both to the drilling rig in use and the casing available. With the recent improvement in tubular goods, the limitations are being revised.

Application. Since the two methods for controlled directional drilling have been described, let us move a step forward and investigate the selection of method as related to the type of salt dome. The two prominent types of domal structures are the deep seated and piercement type domes.

About the Authors

Joynt

Massad

KENNETH R. JOYNT, now assistant division superintendent of Magnolia Petroleum Company's Louisiana-Gulf division, has been with the company since 1946. He graduated from the Missouri School of Mines with a B.S. degree in mechanical engineering. During World War II, Joynt served as a beachmaster in Normandy, and later saw action in the Pacific.

A. H. MASSAD received a B.S. degree in petroleum engineering from the University of Oklahoma. After serving as an engineering officer in the U. S. Navy during World War II, he joined Magnolia Petroleum Company in 1947. His present position is division petroleum engineer for Magnolia's offshore operations.

Consider first the deep seated dome. In this operation, the platform is located as near the crest of the structure as possible, and the first well is usually drilled as a straight hole. If production is established, subsequent development can be made by deviating wells in every direction on a planned spacing pattern. The depth of the pay sand would be the controlling factor on the amount of deviation and the resultant horizontal displacement.

The plan has been given widespread use. One of the most outstanding examples is that of an operator in the Block 149 Field, West Cameron area, in which ten deviated wells and one straight hole were drilled from the same platform. These wells had an approximate true vertical depth of 9000 feet with an extreme bottom hole location of two miles.

This type of development would utilize the increasing deflection angle method, with the casing set on course. The main problem would be to obtain the high angle for the required lateral location of the target.

The development of piercement type domes presents a vastly different problem. Production is confined in most cases to a narrow annulus along the flank of a complexly faulted structure. Dips of the beds or formations are in many cases extremely high and directional control is more involved in these holes.

The general development plan for a piercement type dome consists of locating a platform outside the steep edge of the salt as defined by geophysical work. Here too, the first well is usually a straight hole. If this hole is found to be too far off the edge of the salt for production, a directional well is then drilled in toward the salt. Once production is established, directional wells can then be drilled laterally, or along strike, with the established production. If the platform is located too close or over the edge of the salt, a directional well may then be drilled down-dip or out, so as to reach out over the edge of the salt and explore the formations.

This type of development is shown on Figure 1. Here, Well A, which was the first hole drilled, is the vertical well. The next hole, Well B, was a deviation in toward the salt in an attempt to further locate the salt mass and test the formation up-dip. Well C exhibits a control deviation method whereby the horizontal displacement is reached at a shallow depth and the hole then returned to vertical.

Many piercement domes in the Gulf possess an overhang of salt with accumulations of hydrocarbons confined to a rather narrow annulus under the overhang. In order to avoid the costly overhang drilling, a platform is located off the edge of the overhang and wells are drilled directionally from this platform into the accumulation without drilling salt. In this type of development all wells on the platform are deviated in toward the dome under the overhang, with target areas assigned in conformance with spacing requirements, parallel to the strike of the formation.

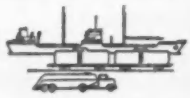
In multi-zone fields and in wildcatting ventures, the method of obtaining the desired horizontal dis-

How Standard invested its money last year to meet your growing oil needs

New Refinery Units to make higher octane gasoline took a big part of the $30 million we spent for plant improvement.

Petrochemicals for plastics and other new products; fertilizers and sprays for bigger crops, took a $20 million investment.

Research and technical services cost nearly $13 million. One result was a technique which promises to greatly increase yields from oil wells, helping conserve U.S. resources.



Transportation Facilities to bring our products from oil field to you were a $10 million item.

New and Modernized Service Stations from Alaska to Mexico cost $16 million, made Standard products more convenient for you.

Exploration for new oil sources cost $134 million. Standard Oil Company of California produced oil and gas from more than 8600 wells in the U.S., Canada and South America to supply your petroleum needs.

production-exploration *refineries* *asphalt refineries* *Standard marketing area*

STANDARD IMPROVED its ability to serve you last year by investing $347 million for new production and distribution facilities and exploration. The rest of our $1⅓ billion income was spent on such items as wages and benefits for our 36,369 employees, supplies from more than 10,000 U.S. firms and crude oil from independent producers. We paid a $107 million tax bill, and our 119,793 stockholders received 7¢ of each dollar we took in as a return on their investment in the Company.

If you wish a copy of our Annual Report for 1955, write to Standard Oil Company of California, Rm. 2153, 225 Bush St., San Francisco 20, Calif.

STANDARD OIL COMPANY OF CALIFORNIA

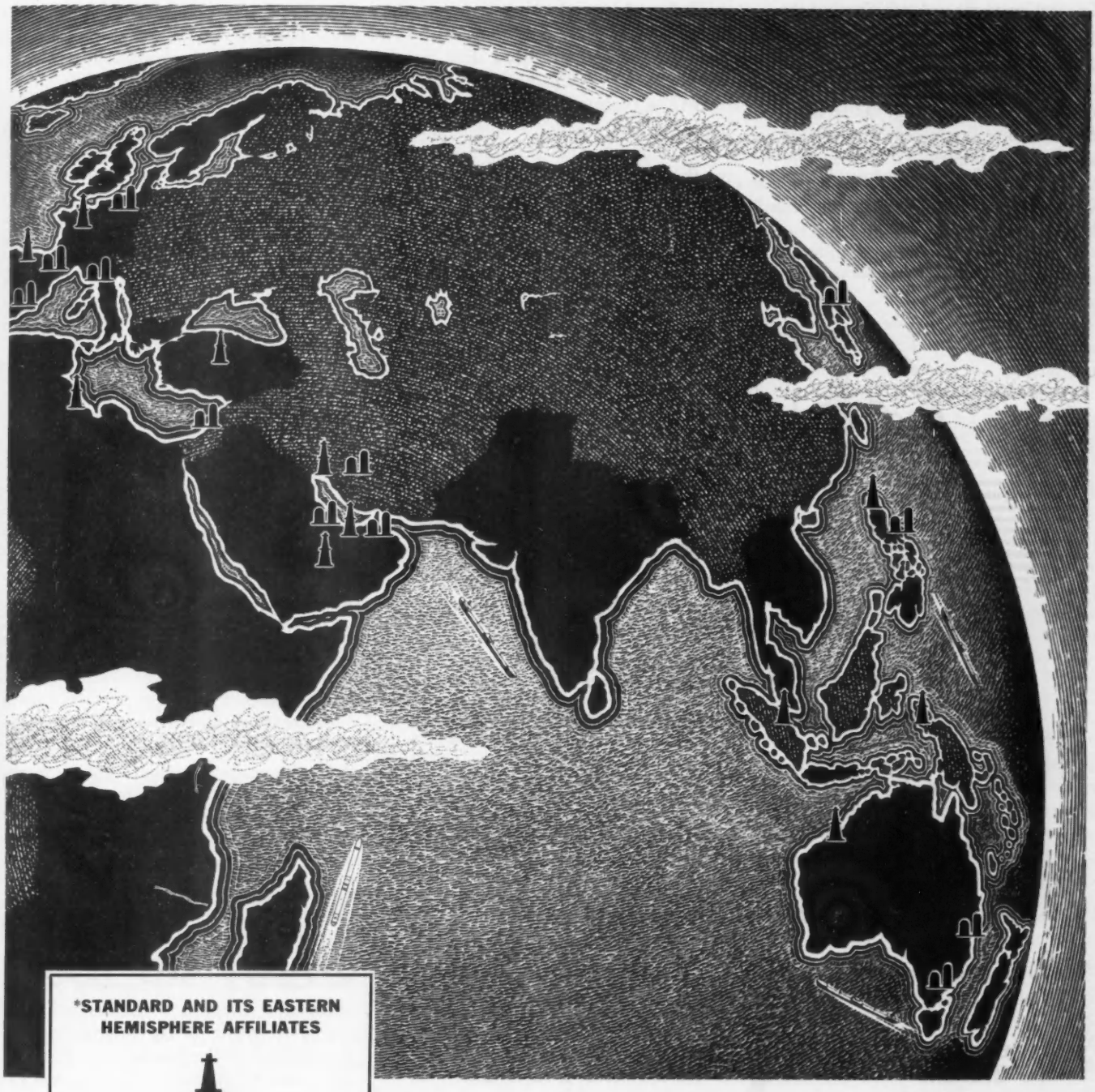
puts petroleum progress to work for you

Petroleum progress means...
to keep pace with your needs, oil companies must invest $74 billion in new U.S. facilities by 1965

1956 1965

Demand for petroleum products will increase about 50% over the next ten years

Part of Standard's earnings came from our work in supplying oil for other free nations



PARIS TAXIS, African river boats and Australian airliners run on gasoline produced by Standard's affiliates. Last year in addition to our Western operations, we* produced oil in 5 Eastern Hemisphere countries, processed it at 15 overseas refineries, supplied petroleum products to 67 countries outside the Iron Curtain. The result was a big boost for industry of Free World nations, conservation of U.S. oil reserves, and a higher standard of living for the peoples of many lands.

If you wish a copy of our Annual Report for 1955, write to Standard Oil Company of California, Rm. 2153, 225 Bush St., San Francisco 20, Calif.

STANDARD OIL COMPANY OF CALIFORNIA
puts petroleum progress to work for you

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

placement and thence vertical depth, gives an operator maximum flexibility in future recompletions and number of formations examined in the most favorable structural position.

Technique. It is not the purpose of this paper to attempt a complete and detailed description of the mechanics of directional drilling. This may be found in literature published by many service companies. However, one of the common practices in use in the Gulf at this time will be described briefly.

The most common and practical tool for obtaining deflection is the retrievable whipstock. The whipstock is faced at a desired angle and is bolted to a special sub just above the drilling bit. It is run to the bottom of the hole, and the desired direction is obtained by orienting with instruments, a magnetic sub, or by setting tools on the surface using a transit. The latter is the least desirable method and is generally inaccurate below 5000 feet.

The direct method of orientation is accomplished by using a monel drill collar with magnets and a single shot instrument. The face of the tool is located in relation to the north magnet in the monel joint. The single shot is then run in the pipe to the landing ring of the monel joint. The survey on bottom determines the number of degrees the whipstock is to be turned to be facing the desired direction. After this correction, weight is applied to the drill stem to shear the pin holding the whipstock to the sub. The drill pipe is then free to rotate through the ring in the whipstock.

Approximately 20 feet of rathole is then drilled below the whipstock with a small diameter bit. The whipstock is removed from the hole and a pilot reamer run to enlarge the rathole to full gage. A survey is then taken to determine the results. If satisfactory, drilling is resumed with a K-monel drill collar in the string below the rotary drill collars and a stabilizer immediately above the bit.

Control of the angle and direction of the hole can usually be obtained by the correct use of drill collars, stabilizers, and rotary speed. Several other influencing variables enter into consideration, but these three are the basic points.

Several minor observations could be pointed out here. In drilling directly up-dip on piercement type domes, where the beds are steeply dipping, the angle of the hole will tend to increase, although the direction of the hole is easily maintained. The reverse is true in drilling directly down-dip, away from the salt, in that the angle tends to decrease, and the direction is not a major problem. If the hole is drilled across dip of the formation, there is a critical point in the relationship of the amount of interception to the strike of the beds, that affects directional tendencies of the hole.

Resume. Summarizing, it is found that the two basic methods of directional drilling are used in development work on piercement type domes, while exploration and development work on a deep seated dome normally requires only the constant angle, on-course method. Both methods have proven highly successful in developing the offshore oil fields in the Gulf of Mexico.

ACKNOWLEDGMENT

This paper was originally presented at the API Southern District Meeting in San Antonio on March 7-8-9, 1956.

ELGEN
ELECTRONIC
WELL LOGGING

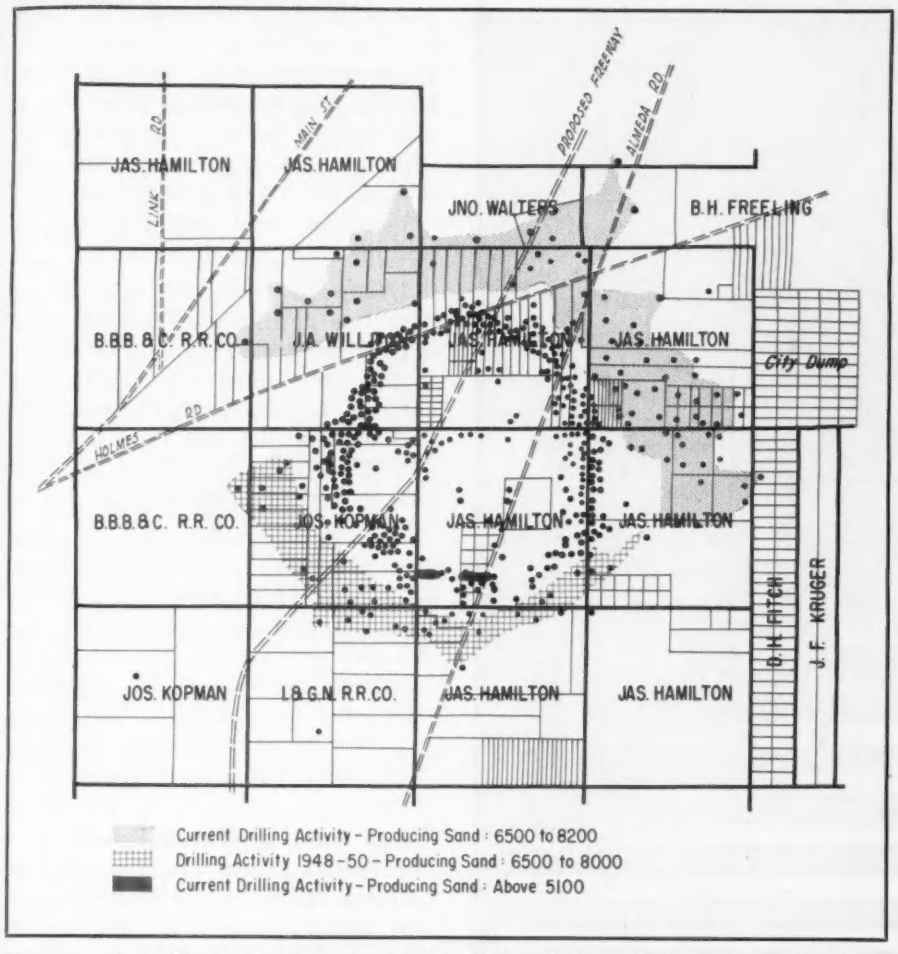
You'll find
EXACTNESS, EXPERIENCE, ECONOMY
when you use Elgen services

DIVISION OFFICES
★ Wichita Falls
★ Abilene
★ Ballinger
★ Graham
★ Gainesville
★ Shawnee
★ Duncan
★ Ponca City
★ Tulsa
★ Fort Morgan, Colo.

Elgen engineers, with years of electric well logging experience, are thoroughly familiar with the areas in which they work. Accuracy, sound interpretation, improved electronic equipment, lower price schedules and minimum rig time save you money. For fast service on your next log, call Elgen.

THE ELGEN CORPORATION
179 PARKHOUSE STREET, DALLAS, TEXAS

A Gulf Coast Feature . . .



Showing wells drilled prior to 1948, from 1948 to 1950, and the area of current activity. Small leases, no spacing regulations, a proposed freeway, and the nearby city of Houston help make it a center of activity.

Pierce Junction Is Hottest Spot on Texas Gulf Coast

From only two wells completed in 1954 and 37 in 1955, the 1956 total had already reached 49 by mid-April. Production has nearly quadrupled.

By CHARLES HOPPINS

ONE OF THE hottest spots on the Gulf Coast in new drilling is the Pierce Junction field—an eight-square-mile semi-developed area on the south edge of the city of Houston.

In this field, where two years ago geologists and operators alike had nearly become convinced of the futility of further exploration and new drilling had come to a standstill, new locations and well completions now are being made at a phenomenal rate.

Already this year as of mid-April, 77 new locations had been staked by 25 operators.

To this same date, a total of 46 oil wells and one gas well were completed to five dry holes.

Majority of wells flowed 140 to 190 barrels with an $11/64$-inch choke on the potential test, while well head pressure for the most part ran between 200 and 600 pounds per square inch. A few wells had to be pumped, while others had more than a thousand pounds per square inch pressure.

As can be expected, production increased, doubled and then tripled over that of the same periods in the preceding year. During the first three months of 1956 the field produced 705,307 barrels—more than three times the 223,940 barrels which the field produced in the same period last year. In March this year, the field produced 285,971 barrels—almost four times the 77,093 produced in March, 1955.

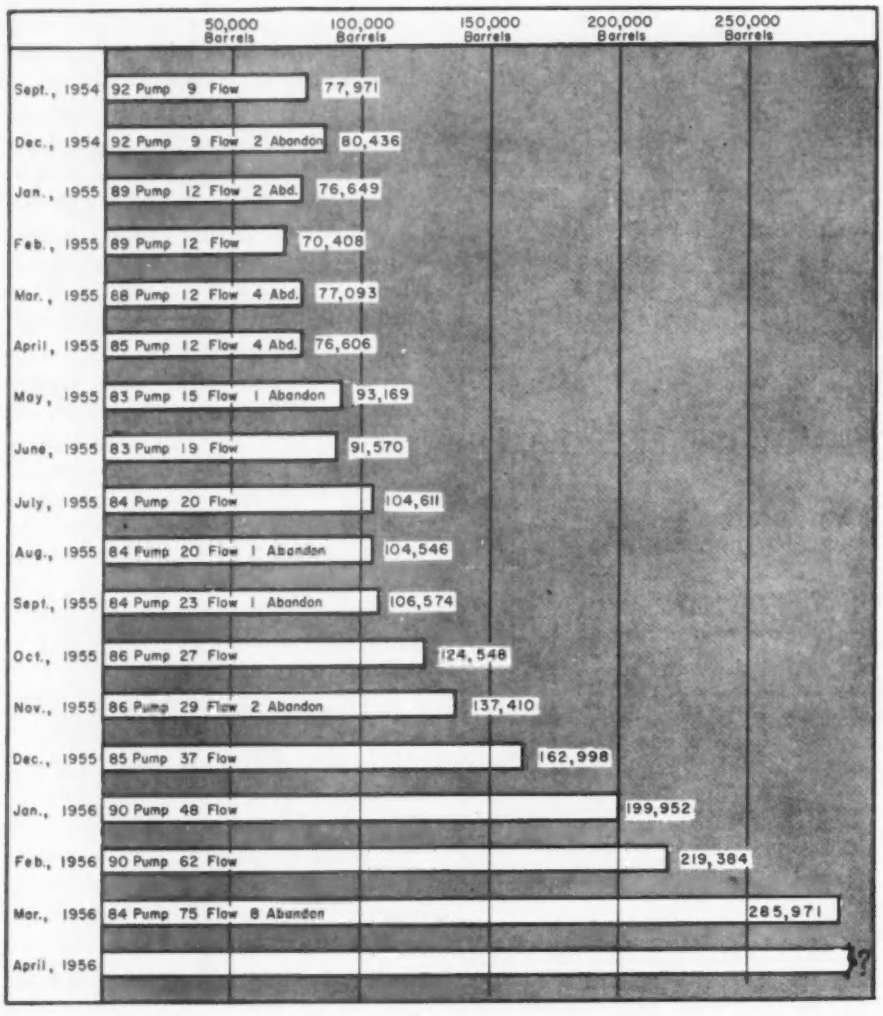
Reason for the increase is the 38 wells completed by the end of March this year, the 35 wells completed last year and the two wells completed in 1954. This makes a total of 75 wells completed by March 1956, exclusive of four gas wells, since the boom began.

Anticipated Production, 1956. Since most of the new wells make their allowable of 140 barrels set by the Texas Railroad Commission, a fairly reasonable conjecture can be made of the increase in production and the total which the field will produce this year.

During the four months preceding April, crude oil production each month increased, in round numbers, an average of 37,000 barrels over that of the preceding month. During November and December last year and first three months this year, 48 wells were completed. This is an average of more than nine wells a month.

If no proration is clamped on the field by the Railroad Commission and this rate of drilling continues until the end of the year, it may safely be assumed the field's total production for 1956 will mount to more than 4,900,000 barrels.

This is a conservative estimate based on a relatively low average when compared to the average 43,-000-barrel increase of February and


50,000 Barrels
100,000 Barrels
150,000 Barrels
200,000 Barrels
250,000 Barrels
Sept., 1954 92 Pump 9 Flow 77,971
Dec., 1954 92 Pump 9 Flow 2 Abandon 80,436
Jan., 1955 89 Pump 12 Flow 2 Abd. 76,649
Feb., 1955 89 Pump 12 Flow 70,408
Mar., 1955 88 Pump 12 Flow 4 Abd. 77,093
April, 1955 85 Pump 12 Flow 4 Abd. 76,606
May, 1955 83 Pump 15 Flow 1 Abandon 93,169
June, 1955 83 Pump 19 Flow 91,570
July, 1955 84 Pump 20 Flow 104,611
Aug., 1955 84 Pump 20 Flow 1 Abandon 104,546
Sept., 1955 84 Pump 23 Flow 1 Abandon 106,574
Oct., 1955 86 Pump 27 Flow 124,548
Nov., 1955 86 Pump 29 Flow 2 Abandon 137,410
Dec., 1955 85 Pump 37 Flow 162,998
Jan., 1956 90 Pump 48 Flow 199,952
Feb., 1956 90 Pump 62 Flow 219,384
Mar., 1956 84 Pump 75 Flow 8 Abandon 285,971
April, 1956
?

Railroad Commission figures on monthly production and number of wells at Pierce Junction during present boom.

March and the 17 completions in March alone.

If this higher trend continues, 1956 production could easily exceed the 5,160,000 barrels produced in 1929, largest yearly production figure in the field's history.

Can present rate last? Some oil men say it won't and can't last. The limit of new sand has been reached. New wells already are playing out. Drilling will soon taper off.

Nevertheless, there is little to indicate slackening of activity. Operators plan to continue drilling and new locations are recorded daily. Number of completions tends to quicken activity, while new flank tests have not as yet entirely curbed expanding efforts. And the eight wells completed out of nine drilled is not the kind of ratio to discourage new efforts.

1954 discoveries. During the three or four years preceding 1954, drilling was sporadic and confined mostly to Miocene and Frio reservoirs at the edge of the salt and through the overhang on the north and northeast sides.

Discovery of productive Vicksburg formations on the east flank of the piercement salt dome late in 1954 set off the boom. In little over a year, drilling had mushroomed to encircle the east, northeast, north and northwest flanks.

Events leading to the discovery began about May, 1954, when John G. Mayo got a 90-day farm-out from Gulf Oil Corporation on the 210-acre H. C. Cain tract. He approached 18 or 19 operators in an attempt to persuade one to make a test well. Operators replied there was no oil producing sands in this area and the only good Vicksburg was on the south flank.

Mayo was about ready to give up and turned his attentions to Moss Bluff field. About this time E. C. Scurlock wanted to drill on some land of Mayo's in Moss Bluff. Mayo told him he could, if he also would drill in Pierce Junction. Scurlock finally agreed and took the job on a two-well farm-out, one in Moss Bluff and one in Pierce Junction.

Drilling on the Cain lease began only two or three weeks before the expiration date on the Gulf farm-out. It took more than a month to drill the well. It was completed September 3, 1954 in a thin Vicksburg strata at 7103-17 feet and produced 141 barrels through a ¼-inch choke.

The next month Scurlock completed another one to the east at 7321 feet to pay. However, it was a poor well and produced only 28 barrels per day on the potential test. This was the No. 2 H. C. Cain. The only other well drilled in 1954 was a dry hole on the Hermann Hospital estate on the southwest flank.

H. C. Cain produces boom. The No. 3 H. C. Cain was completed in January, 1955 to the north of the first one. It came in at 147 barrels through a $^{9}/_{64}$-inch choke on the potential test, and the boom was underway.

No new wells were completed in February. Three oil wells and one gas well were completed in March and one oil well was completed in April. By mid-1955 eight more tests were completed, five by Scurlock, all on the east flank.

By the end of the year 40 wells had been completed, including three gas wells. Two of these completions were made on the north flank.

Drilling area spreads to north flank. In 1956 drilling spread to the north flank and the majority of wells were drilled between the northwest and northeast flanks, with the greater number centered to the east side of the north flank.

The first completion on the north flank was made by L. H. Smith on the 67-acre Holmes tract southwest of the dome in October. It was perforated at 6805-6820 feet and flowed 181 barrels through a $12/64$-inch choke.

In November, Magnolia Petroleum Company and Stanolind Oil & Gas

Company completed their first producer on the 448-acre Shamrock-Hilton lease less than a mile off the north flank to 7216 feet to pay. It flowed 187 barrels on the potential test through a $12/64$-inch choke. In January 1956, Magnolia and Stanolind completed another on the adjoining 230-acre Houston Fat Stock Show lease to 7508 feet to pay.

The new completions in the north and east flank areas are all to the Vicksburg and range in depth from 6500 to 8200 feet. However, not all wells drilled currently are to Vicksburg. Some shallower wells close in have been completed to Miocene or Frio formations from 3000 to 5000 feet. Most of these are on the south flank.

Toward the last part of April, 27 rigs were in the field. The majority were concentrated on the north flank.

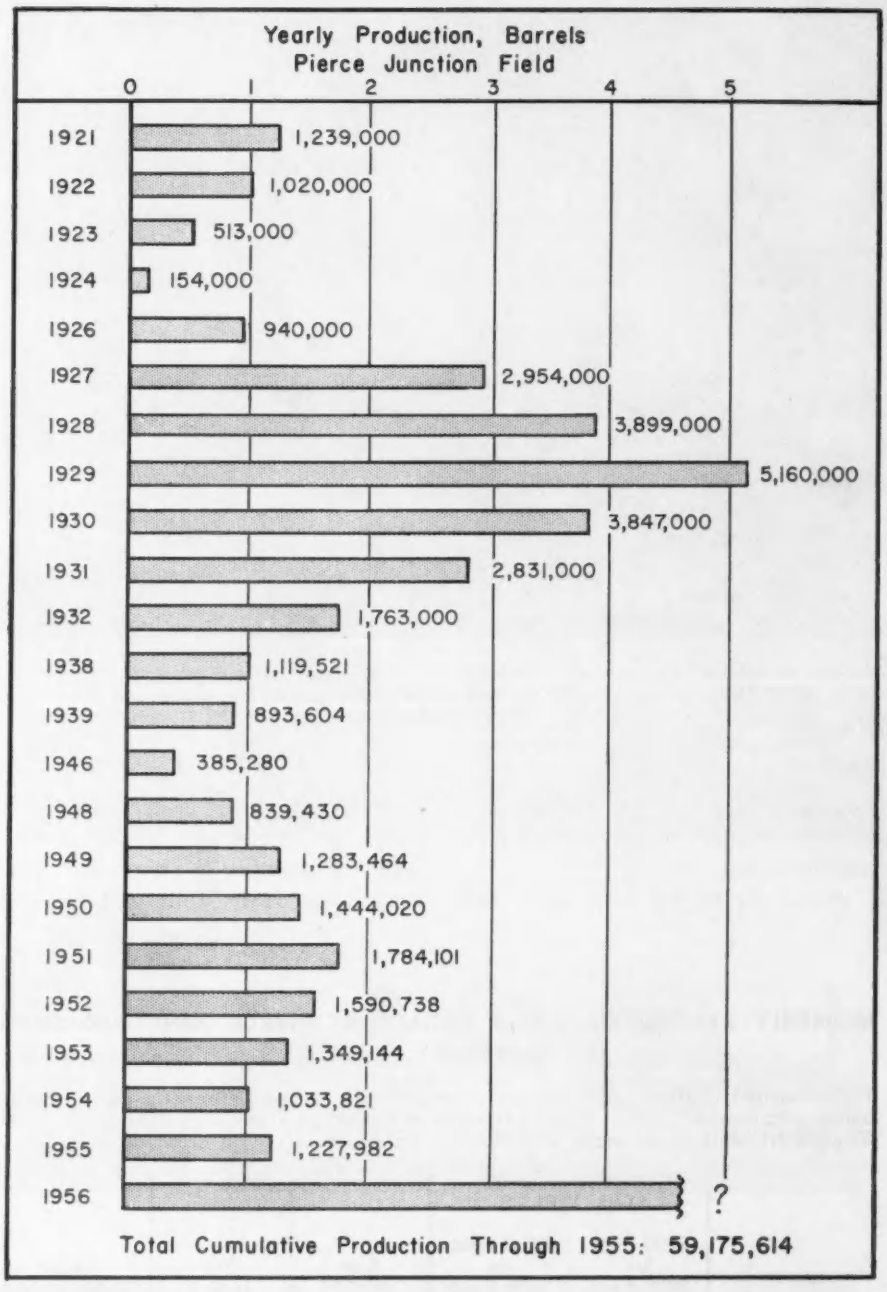
Vicksburg in south flank. Vicksburg was first discovered in the field in July, 1935 by the Navarro No. 3 Cain. A small Vicksburg boom was touched off when McCarthy Oil & Gas Company and Gulf Oil Corporation opened new deep production a half mile off the south flank with the No. 1 R. C. Mowery completed November 17, 1947. Pay depth was 7564-70 feet. Total depth of this well was 12,940 feet and it probably is the deepest well drilled in the field.

In the succeeding two years, Vicksburg production encircled the south flank. Drilling on the south flank was not nearly as extensive as present drilling and was closer to the flank. After 1949 drilling slacked off.

Since then, two tests have been made deep on the south flank, both by Scurlock in 1955, and were not productive. Another test has been staked this year deep on the southwest flank by Gulf and McCarthy.

With discovery of Vicksburg on the south flank, production increased from a low of 385,280 barrels in 1946 to a high of 1,784,101 barrels in 1951.

Total production. In 1952 there were 111 producing oil wells and one gas well. At the end of 1954, the number of producing wells had dropped to 101, nine flowing and 92 pumping. There was one gas well and one gas-condensate. Total production had dropped to 1,033,821, lowest yearly figure since 1948 when it was 839,430.



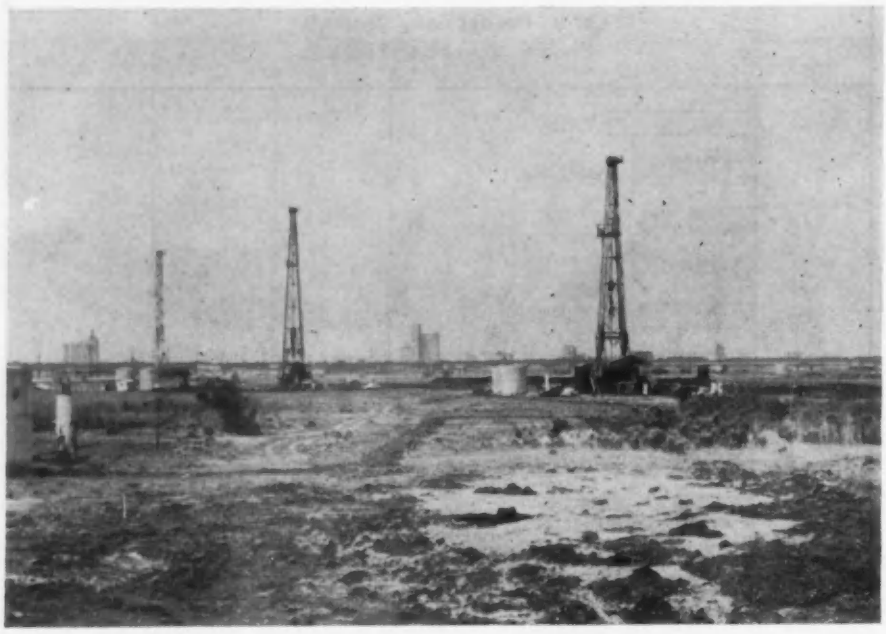
Railroad Commission production figures. If activity continues at its present rate 1956 will be a banner year for Pierce Junction field.

In 1955 production increased to 1,227,982, bringing the total cumulative production for the field as of January 1, 1956 to 59,175,614 barrels.

Gas well production. Total production was 276,671 million cubic feet and 4711 barrels of distillate in 1954. In 1955 there were two gas wells and one gas-condensate. Total production was 350,444 million cubic feet and 5522 barrels.

At the end of 1954 one gas well was producing from Miocene at 3200-3400 feet and one from Yegua at 9600 feet on the west flank. In 1955 Lenoir M. Josey completed two gas wells at 8100 feet on the east flank. These two wells produced 176,436 million cubic feet during January of this year, and 4780 barrels of condensate.

Small leases and no spacing requirements. Being a piercement type formation Pierce Junction is not subject to any spacing requirements. This fact plus the size and number of leases has had much to do with the complicated exploitation of the field and the current rush to drill. Since the area is partically developed, some leases are less than an acre in size. In March of this year there were 67



Within two miles of the Shamrock-Hilton hotel are these three rigs operating on the northeast flank of the field. Shamrock is at left background. Building between second and third rig is Prudential building.

Big Six Drilling Company's steam rig is pictured deep on the north flank on Magnolia and Stanolind's Shamrock-Hilton lease going for Yegua.

producing leases in the field, most of them were under 50 acres and a large number under five.

About the largest lease is the 448-acre Shamrock-Hilton. There are only a few leases over 200 acres. This and the number of operators have occasioned more wells to be drilled in a small area. This is particularly true on the east side of the north flank.

As a result, some operators complain of loss of pressure, loss of production and of water coming in. Some have even expressed fear of not getting enough production to pay out their wells.

One well which ceased to produce, temporarily at least, shortly after it was completed was the Majo Oil Company's Rosenstock No. 1 on the north flank. Rising water cut off production.

There is little likelihood of establishing spacing requirements in the field. Although some operators think something should be done, most agree spacing is not the answer and would not be applicable in this field.

Proposed freeway. Another thing which has complicated matters is the planned multi-million dollar Almeda Freeway which will pass through the middle of the field as indicated on the field map. Plans for the six-lane freeway with service roads were completed the latter part of 1955 by the Texas Highway Department before drilling in the right-of-way had begun.

In November the Harris County Commissioner's Court set a hearing on the lines and advertised the route of the 300-foot right-of-way on which

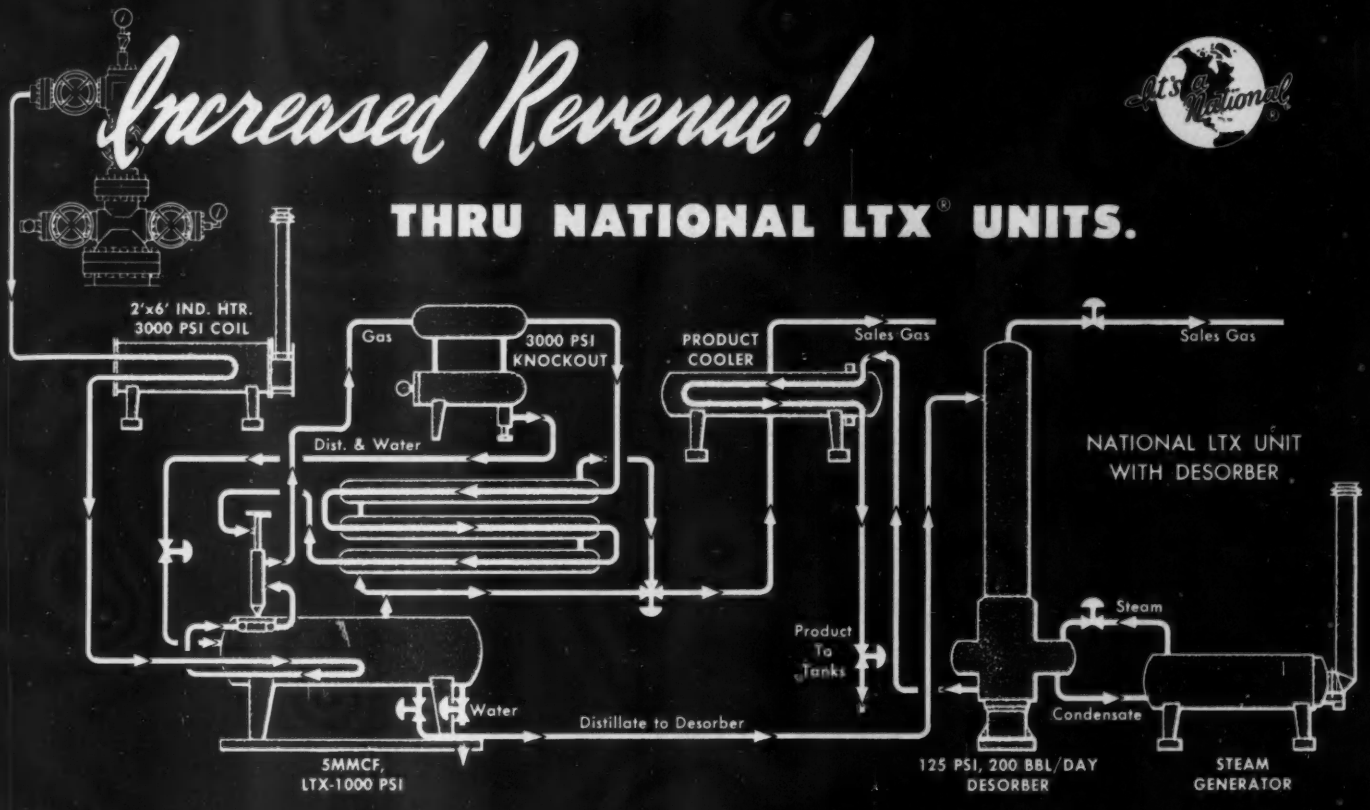
MONTHLY RECORD OF WELLS DRILLED AT PIERCE JUNCTION SINCE SEPTEMBER, 1954

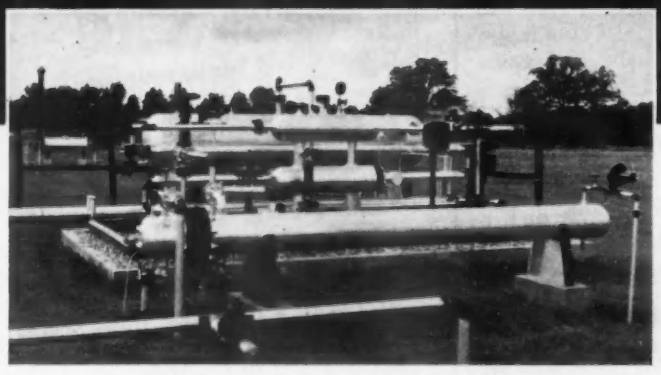
The Railroad Commission records show that since the beginning of the latest boom (September, 1954), 97 wells have been drilled at Pierce Junction. Of These 83 were oil wells, 4 gas wells, and 10 were dry holes.

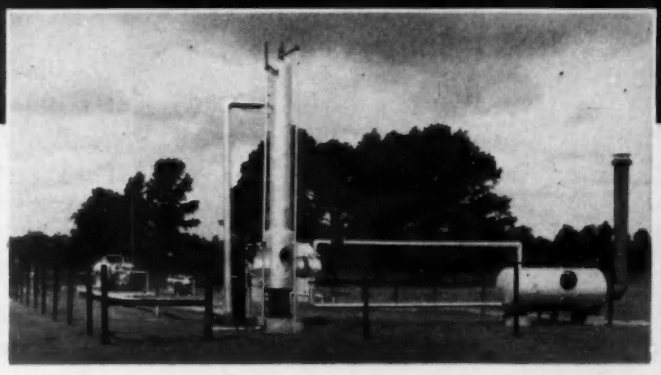
	OIL WELLS				
	3000 Feet to 5000 Feet	5000 Feet to 8200 Feet	Gas Wells	Dry Holes	Total Completions
1954:					
September...	..	1	..	..	1
October.....	..	1	..	..	1
December...	..	..	..	1	1
1955:					
January.....	..	1	..	..	1
February....	..	..	..	..	0
March.....	..	3	1	..	4
April.....	1	..	..	..	1
May.....	..	3	..	1	4
June.....	1	1	..	..	2
July.....	..	1	..	1	2
August.....	1	2	..	..	3
September..	..	4	1	..	5
October.....	..	5	..	1	6
November...	..	4	1	..	5
December...	1	7	..	1	9
1956:					
January.....	1	13	..	4	18
February....	..	7	..	1	8
March.....	1	16	..	..	17
Mid-April...	..	8	1	..	9
TOTAL....	6	77	4	10	97

Increased Revenue!

THRU NATIONAL LTX® UNITS.







Installation of a National LTX Unit with desorber on this gas distillate well near Shreveport, Louisiana, INCREASED the recovery 14 barrels of stock tank liquid per MMCF of sales gas produced.* The well originally tested 70 barrels per MMCF with conventional separation equipment and increased to 84 barrels per MMCF of sales gas produced after the installation of LTX equipment. The LTX unit operates at approximately 300 psi and 5°F. Flowing pressure is approximately 2500 psi.

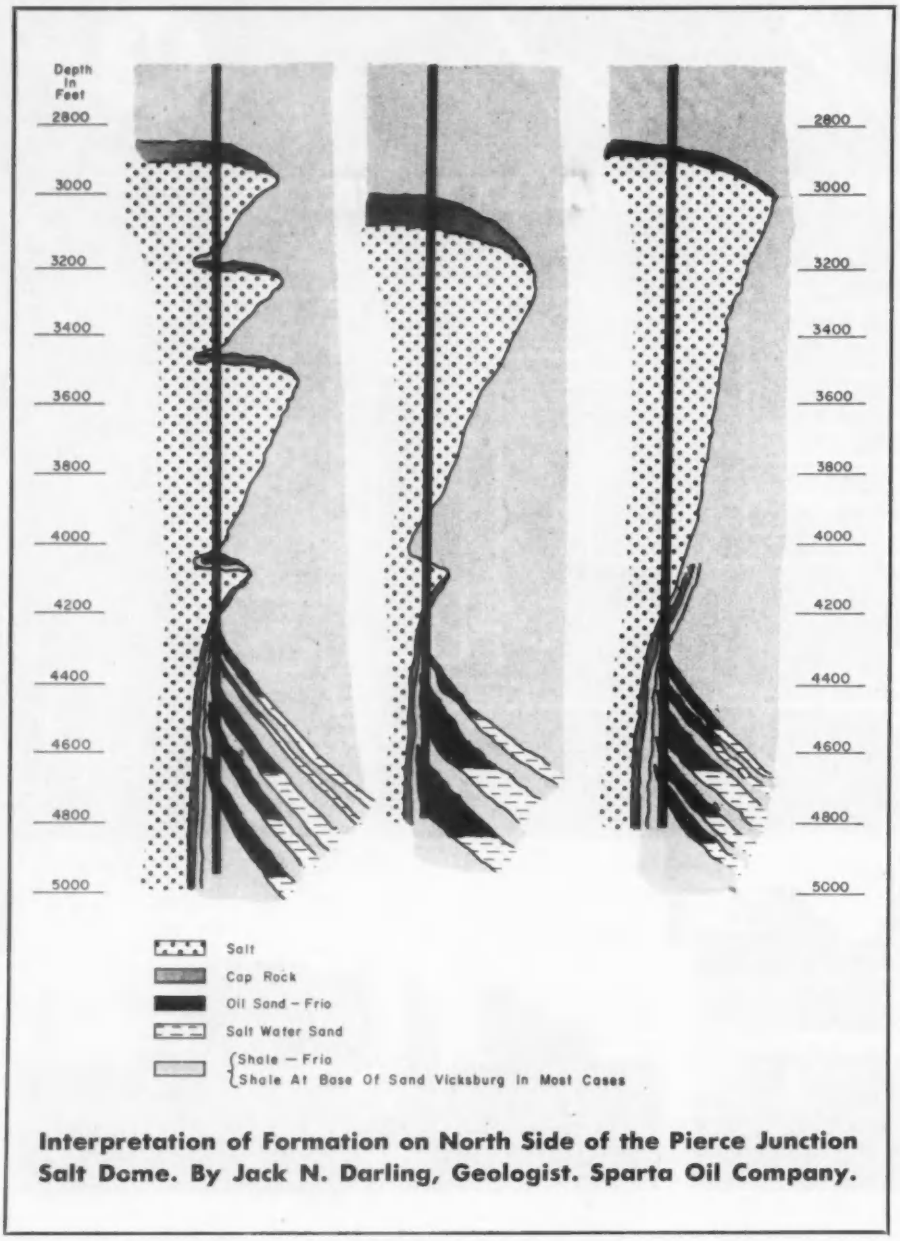
To receive maximum recovery from your lease, contact a National Tank Company representative in your area. You will find him nearby with "know how" and production equipment ready to serve your producing needs.

**For a more finite economic evaluation, the differences in recovery should be based on the unit of well effluent. This is not data that can easily be observed in the field for it requires calculations based on the wellstream hydrocarbon composition. Such determinations are often valuable.*

It's a National®

NATIONAL TANK® COMPANY

TULSA, OKLAHOMA



Interpretation of Formation on North Side of the Pierce Junction Salt Dome. By Jack N. Darling, Geologist. Sparta Oil Company.

Drilling through the overhang to possible production at the base of the dome imposes considerable difficulty on the operators. These sketches illustrate the problems involved in hitting the producing sand at the right point. The target is small. On one side shale and salt—on the other, water. This plus the directional and controlled drilling necessitated by the narrow leases makes operators wary. Only the chance of hitting an unrestricted jackpot makes the risk worthwhile. These, no doubt, are some of the reasons why no production restrictions have been imposed on the field to date. It allows recovery of oil which might otherwise go untouched.

are at least two producing wells. In February, the court took final action on the building lines, making the order retroactive to December 1, 1955, date of the hearing.

However, it is believed construction will not get underway before 1960. The recent declaration by the Texas Supreme Court making the Harris County wheel tax for right-of-way unconstitutional may further delay construction. Most operators are cognizant of the proposed route and have planned operations accordingly.

In buying up right-of-way, the county mainly is interested in surface rights, leaving the way open for small land owners to form a pool for mineral rights.

It is unlikely drilling will extend north to the planned location of the three-level interchange which will occupy 75 acres including approaches.

Field statistics and early history. Information on the early history of the field is scanty. According to Texas Railroad Commission records, the field was discovered about 1901. Gas seeps, paraffin dirt and a slight surface elevation led to the discovery.

Gulf Production Company drilled the first commercial well—the No. 2 Taylor—in 1920 and 1921. Total depth was 3525 feet. The well produced 75 barrels a day and started an active drilling campaign.

First year production in the field, which received its name from the G. H. & S. A. Railway Pierce Junction just northeast of the field, was 1,239,000 barrels. By 1925 production had dropped to 54,000 barrels. The first Marginulina production on the Gulf Coast was opened in the field in 1925.

In 1926 production climbed to 940,000 and continued increasing to 2,954,000 in 1927, reaching its peak in 1929 with more than five million barrels. After 1929, production dropped off and in 1946 reached its lowest ebb, 385,280 barrels.

The Railroad Commission lists eight formations in the field. Formations and depths were published by the commission in 1952. They are as follows:

Miocene	3200-3760
Discorbis	3740-3900
Heterostegina	4000-4350
Marginulina	4435-4490
Frio	4515-5462
Vicksburg	5550-7240
Jackson	7358-7570
Yegua	9626-9642

The salt dome is eliptical in plan with the major axis running north and south. It leans to the north, mushrooms to some extent and, of course, has steep sides. Formations next to the salt on the north are at an angle of 45 degrees or more below Miocene. Minimum depth to cap rock is 630 feet and minimum depth to salt is 950 feet. The cap rock is porous and has not produced oil.

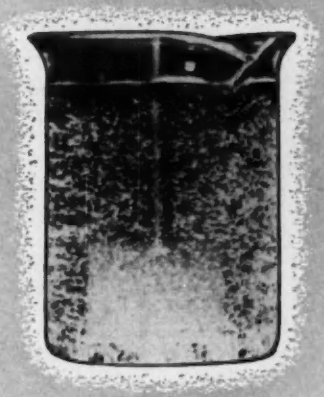
All production is from flanking sand bodies. Frio reservoirs have active water drive. Vicksburg has solution gas and gas cap. In 1952 the Commission gave the estimated ultimate recovery as 53 million barrels. This, of course, did not include the area of present activity.

Drilling. Drilling in the field is not difficult and no unusual drilling problems have been reported except for necessary directional and controlled

A New, Better Coagulant

NALCO 600

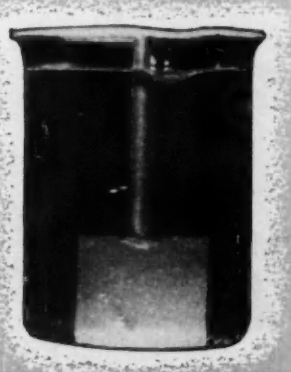
POLYELECTROLYTE



Alum

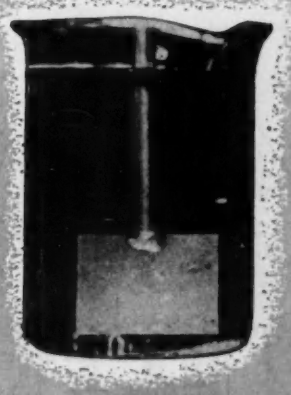
● As a coagulant in water clarification, and under many process coagulation conditions, new and different Nalco 600 has shown such great promise, both in performance and economy characteristics, that it has now been made available for general use as an established member of the Nalco family of chemical aids to industry.

Extremely difficult coagulation conditions provide especially economical applications for Nalco 600. It can be used alone or in conjunction with other coagulants. A very low dosage of Nalco 600 usually permits as much as 50% reduction in dosage of alum, activated silica, iron sulfate or clay type treatments . . . and results in a cleaner, clearer supernatant liquid.



Alum plus
typical polyelectrolyte

Nalco 600 was invented in the Nalco Laboratories, and is being manufactured *only* by Nalco. For complete data on Nalco 600, and expert technical assistance to solve your clarification and coagulation problems, call Nalco now.



Alum plus
Nalco 600

NATIONAL ALUMINATE CORPORATION

Telephone: POrtsmouth 7-7240

6286 West 66th Place • Chicago 38, Illinois

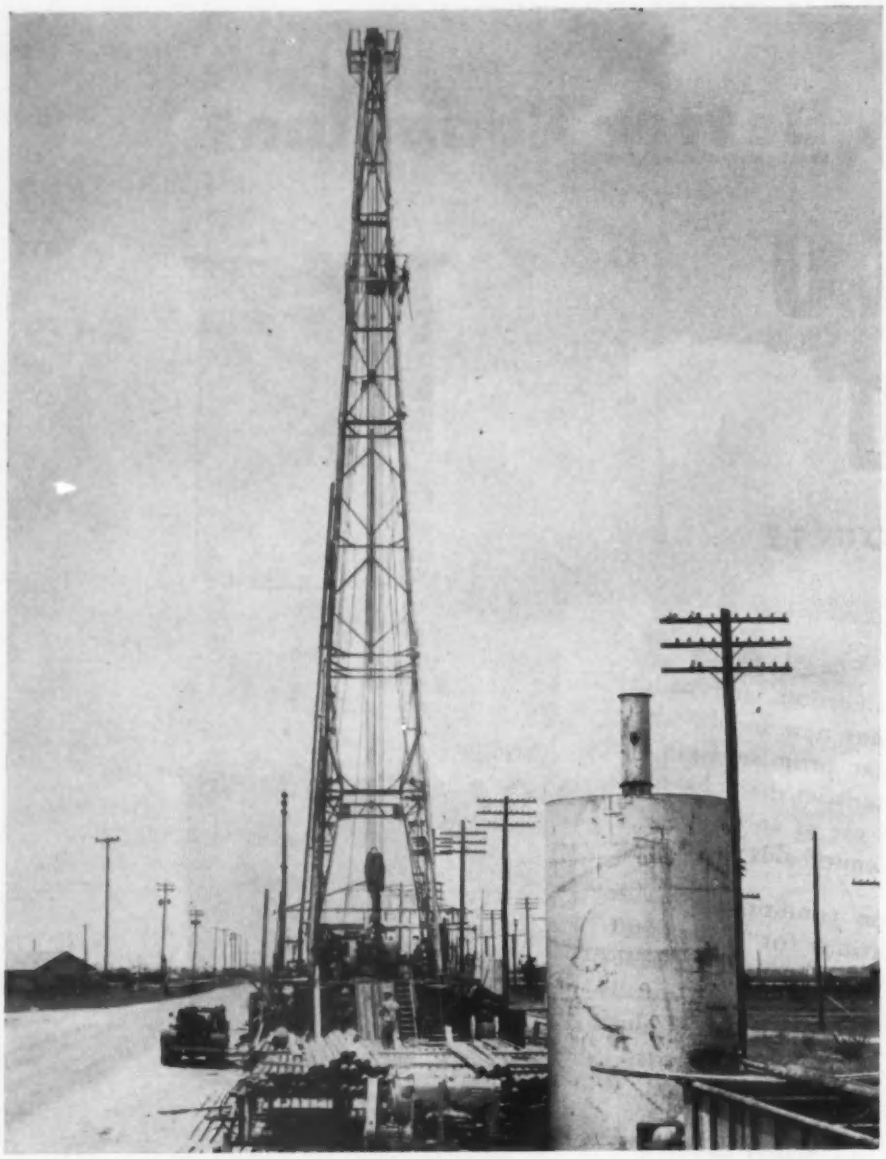
IN CANADA: Alchem Limited, Burlington, Ontario

NORTHWESTERN UNITED STATES, HAWAII and ALASKA
The Flox Company, Inc., Minneapolis 3, Minnesota

ITALY: Nalco Italiana, S.p.A. SPAIN: Nalco Espanola, S.A.

WEST GERMANY: Deutsche Nalco-Chemie GmbH

ANOTHER *Nalco*® **PRODUCT. Serving Industry through Practical Applied Science**



Squeezed into 33 feet of operating space is this C. J. Foster Drilling Company rig on L. D. Cain's T.&N.O. Railroad No. 2.

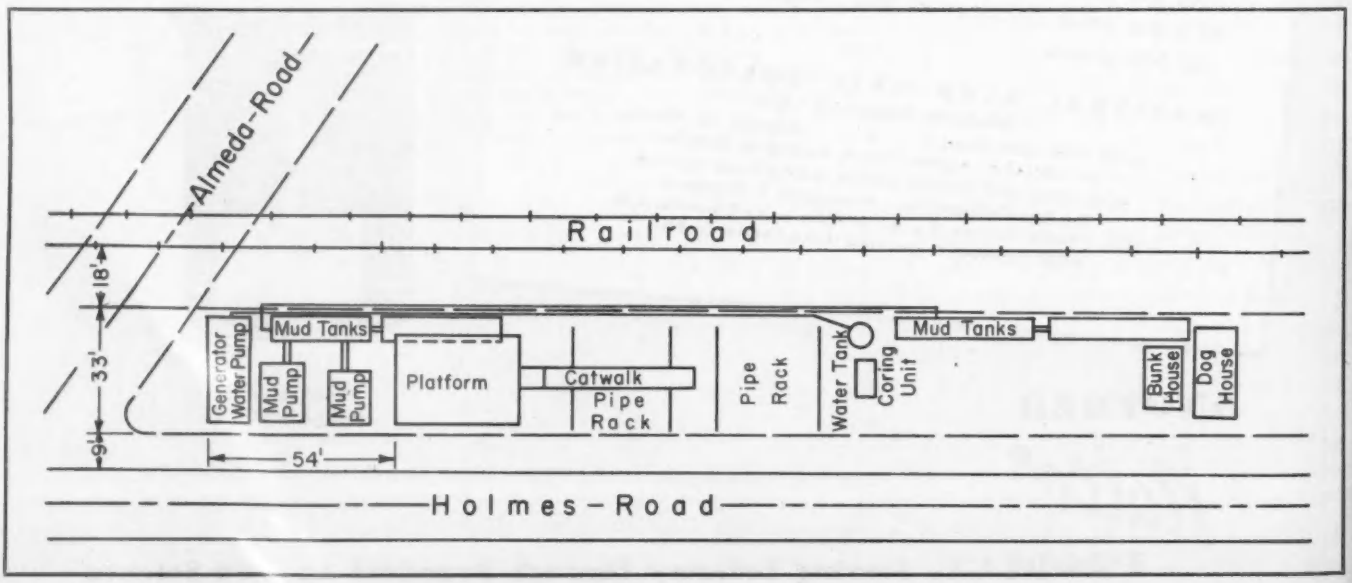
drilling through the dome overhang. Most drilling is through shale, sand and lime with some clay. Average drilling time to 7500 feet is around two weeks, and takes upwards of eight bits on most holes. Casing is set through and perforated. Many wells are directionally controlled and drilled due to narrow lease lines.

Considerable drilling is being done along railroad rights-of-way. In some cases this involves operating in a space less than 11 yards in width.

Salt production and LPG storage. Other drilling in the field includes two brine wells completed this year by Sparta Oil Company for production of brine and storage of low pressure gas. Texas Brine Corporation has three brine wells west of Almeda road near the south center of the salt dome. The three wells have the capacity to produce 1000 tons of salt a day or 4000 tons of brine. The company, which has pipe lines to industrial areas, also produces brine for workovers.

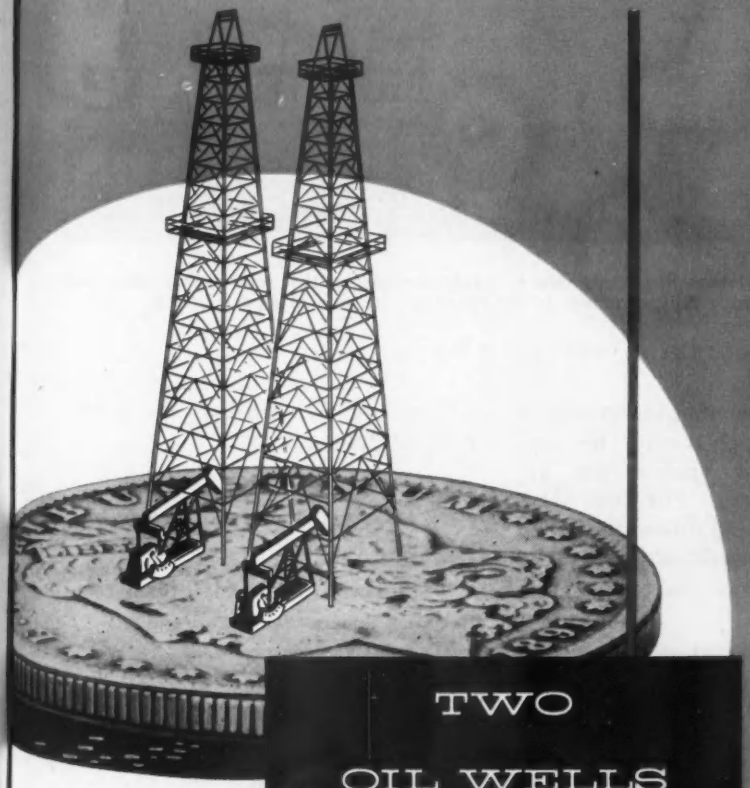
Sparta's two brine wells are located on the southwest side of the dome. In drilling the wells it was necessary to seal off the porous cap rock to prevent loss of drilling fluid and permit cementing. A 13⅜-inch casing was set and cemented on top of the cap rock at 846 feet. The hole was drilled 154 feet through the cap rock and 100 feet into the top of the salt.

Next 450 feet of 10¾-inch liner using two metal petal baskets was set



Here's how a toolpusher rigged up on L. D. Cain's T.&N.O. Railroad No. 2. He was restricted by the intersection on the northeast corner of Almeda and Holmes Road with 33 feet of operating space between railroad allowance and Holmes Road right-of-way.

A PROGRESS REPORT ON OILMASTER DUAL ZONE PUMPING EQUIPMENT



TWO OIL WELLS FOR THE PRICE OF ONE

Until about four years ago, when our customers asked us about pumping two zones from the same well bore, we told them to forget it and drill a second well. However, with economics strongly favoring the dually completed single well, we were forced to change our minds.

The first Oilmaster Dual Zone pumping hookup was run in May 1953. It worked, but it fell short of being the tool we wanted. It did, however, point up the importance of having trained men in the field to design and supervise installations, and to assist in a program of research and development. A special division was formed, the tools were redesigned, and the product gained customer acceptance. This newly created Technical Service Division has been expanded as required to pace the increased demand of a broadening market.

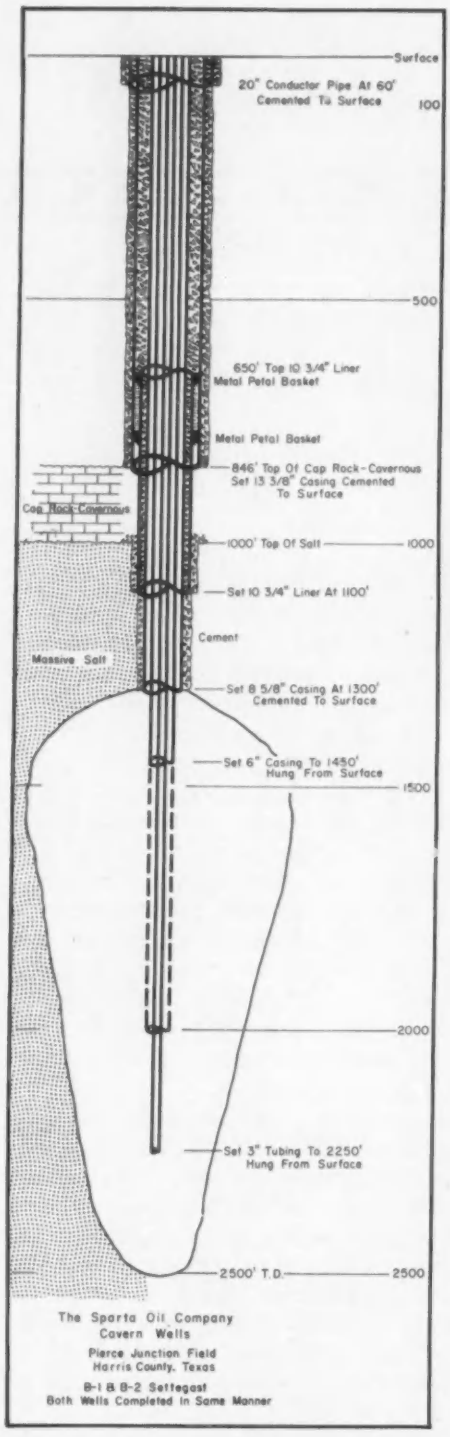
Many changes have been made in the Oilmaster Dual Zone Pumping Equipment since 1953. The current models are less complicated —easier to run—easier to repair, and less expensive than old number one. But the biggest change has been in the diversity of models to handle varied pumping conditions. *Now it is possible to offer the producer every control in a dual well that is possible in a single well, including separating gas or treating paraffin or corrosive fluid in either or both zones.*

Want to hear more? Contact your nearest Oilmaster Representative or write Fluid Packed Pump Co., Box 64, Los Nietos, California, for complete information.

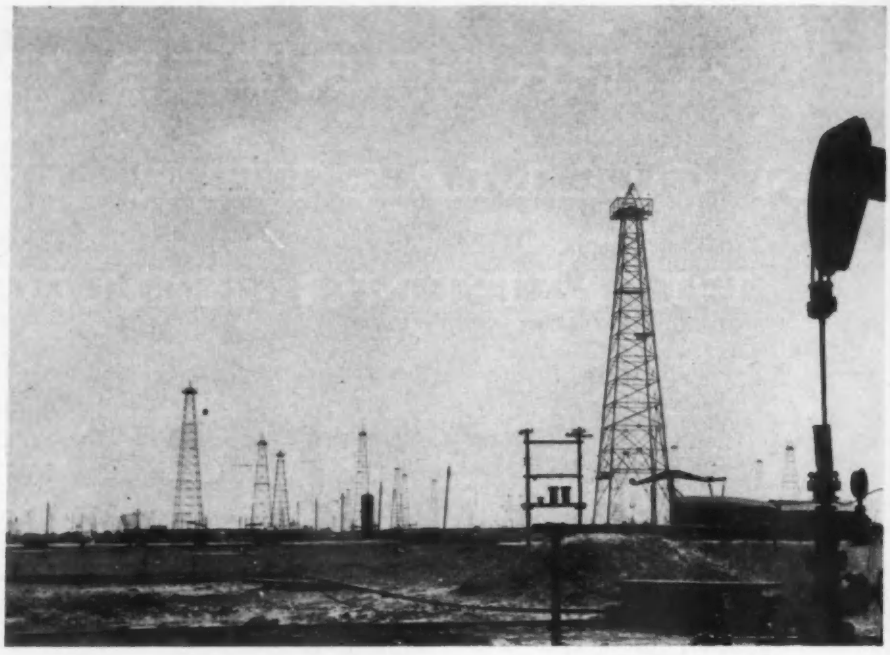
oilmaster PUMPS FOREMOST IN THE INDUSTRY

FLUID PACKED PUMP COMPANY, P. O. Box 64 • Los Nietos, California

Main Office and Plant, Los Nietos, Calif. • Dist. by the National Supply Co., Pittsburgh, Pa. Export: The National Supply Co., Inc. Export Division, 600 Fifth Avenue, New York • Co-Distributors: Union Supply Co., Beacon Supply Co., Industrial Supply Co.


Surface
20" Conductor Pipe At 60' Cemented To Surface
100
500
650' Top Of 10 3/4" Liner Metal Petal Basket
Metal Petal Basket
846' Top Of Cap Rock-Cavernous Set 13 3/8" Casing Cemented To Surface
Cap Rock-Cavernous
1000' Top Of Salt
1000
Set 10 3/4" Liner At 1100'
Cement
Massive Salt
Set 8 5/8" Casing At 1300' Cemented To Surface
Set 6" Casing To 1450' Hung From Surface
1500
2000
Set 3" Tubing To 2250' Hung From Surface
2500' T.D.
2500
The Sparta Oil Company
Cavern Wells
Pierce Junction Field
Harris County, Texas
B-1 & B-2 Settegast
Both Wells Completed In Same Manner

This pattern was followed in the formation of two brine wells on the southwest side of the dome. They will provide storage space for low pressure gas of about 100,000 barrels.



Looking south from Holmes Road, this view of empty derricks on the west flank of the field testify to former drilling activity in the field, and location of pumping wells.

and cemented with 100 feet extending into the salt as illustrated. This effectively sealed off the cap rock. Drilling continued to 1300 feet and 8⅝-inch casing set and cemented. Final drilling was completed to 2500 feet.

A string of 6-inch casing was set from the surface to 1450 feet with 3-inch tubing run to 2250 feet. Water was pumped down the 3-inch tubing and up the 6-inch casing for one week. Then the process was reversed for 30 days. For four days water was circulated down the 6-inch and out the 8⅝-inch to enlarge the top of the cavern and round off rough edges.

The 6-inch was then lowered to 2000 feet, allowing low pressure gas to be stored in the top of the cavern while brine was being extracted from the bottom.

Storage capacity of 100,000 barrels for both wells will be reached about July, 1956, and it is estimated that the caverns will be enlarged about 15 percent a year. It is anticipated that a pressure of about 200 psi will be maintained on the gas stored.

Present activity. Pierce Junction has astounded the experts. Already in one year, it has seen more activity than was thought possible in the field's lifetime. It almost seems that when Scurlock and Mayo drilled the No. 1 H. C. Cain they pulled the stopper out of a powder keg.

Since then:

- A spectacular oil boom has spread to two flanks, hitting 87 producers (including gas wells) to 10 dry holes.
- A multi-million-dollar roadway has been routed through the field.
- Drilling has picked up in the shallower formations.
- Locations for new test wells are being staked in the remote corners of the field.
- Two brine wells have been completed.

When and where it will stop is anybody's guess. Trice Production Company has been awarded the lease on the 300-acre Houston city dump land far on the east flank. The only drilling this far out on the east flank are two producers by Beck Oil Company in a developed area just south of the dump.

C. J. Foster Drilling Company et al finished a Vicksburg test far out on the north flank on the J. H. Wynne unit in April. It was a dry hole and was just north of Majo Oil Company's well which was having water trouble.

Further to the west Magnolia and Stanolind announced intentions to drill to Yegua. Most operators believe the limits of the field on the north and east flanks has been fairly well established. Meanwhile the number of the companies and individuals drilling in the field is increasing.

ACKNOWLEDGMENT

The author wishes to acknowledge the cooperation of the Texas Railroad Commission, C. D. Lockwood Petroleum Statistics, Zingery Map Co., Rinehart Oil Reports, State Highway Department, Harris County and many operators in securing this information.

Pumping Progress Report

FOR PETROLEUM ENGINEERS

An advertisement prepared by the Aldrich Pump Co., Member of Hydraulic Institute, U.S.A.

SPACE, in many pump installations, is a major problem. Another is the necessity for special foundations. When new installations are considered, these factors may dictate more elaborate construction than should be necessary. And for replacement or modifications of existing systems, they may require expensive piping and equipment changes.

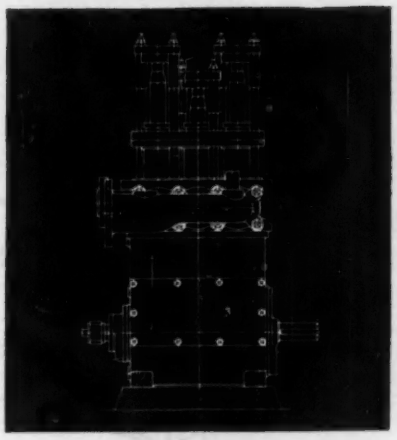
COMPACTNESS OF DESIGN, while often desirable, is not necessarily the answer. Simplicity of design — as in the case of ALDRICH Direct Flow Pumps — may be a better solution.

SIMPLICITY OF DESIGN brought about the first inverted Triplex and Quintuplex Pumps and ultimately Septuplex and Nonuplex Pumps. This Aldrich design innovation brought to pump users many economies of space, maintenance and operation they had never known.

INVERTED PUMP DESIGN permits the use of less expensive foundations. With the crankshaft located near the floor there is no need for expensive foundation work to raise the driver or lower the pump. Then, too, inverted pumps require fewer square feet of floor space than conventional pumps.

MAINTENANCE COSTS ARE REDUCED. Fluid-end, where most work is done, is at chest level. Bearing replacements are made without removing heavy crankshafts or connecting rods. Crossheads on all Direct Flow Pumps can be worked on or removed from pump without disturbing fluid-end.

TELL US ABOUT YOUR PUMPING PROBLEM. The chances are that one of our standard pumps — or a modification of one — will do your job. Detail your problem and we'll send you a copy of the Data Sheet that describes the Direct Flow Pump we recommend. Write to: The Aldrich Pump Company, 4 Pine Street, Allentown, Pa.



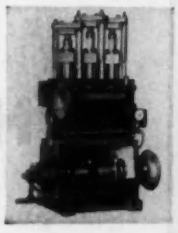
Aldrich inverted vertical pump design

...for your tough pumping problems specify ALDRICH

The entire line of Aldrich Direct Flow Pumps feature two outstanding design innovations—inverted vertical design and sectionalized fluid-ends. These two features have helped make Aldrich the organization hydraulic engineers turn to when they face tough pumping problems. If you have a pumping problem, turn it over to the men who have never turned down a challenge.

CHECK THESE ADVANTAGES OF INVERTED PUMP DESIGN:

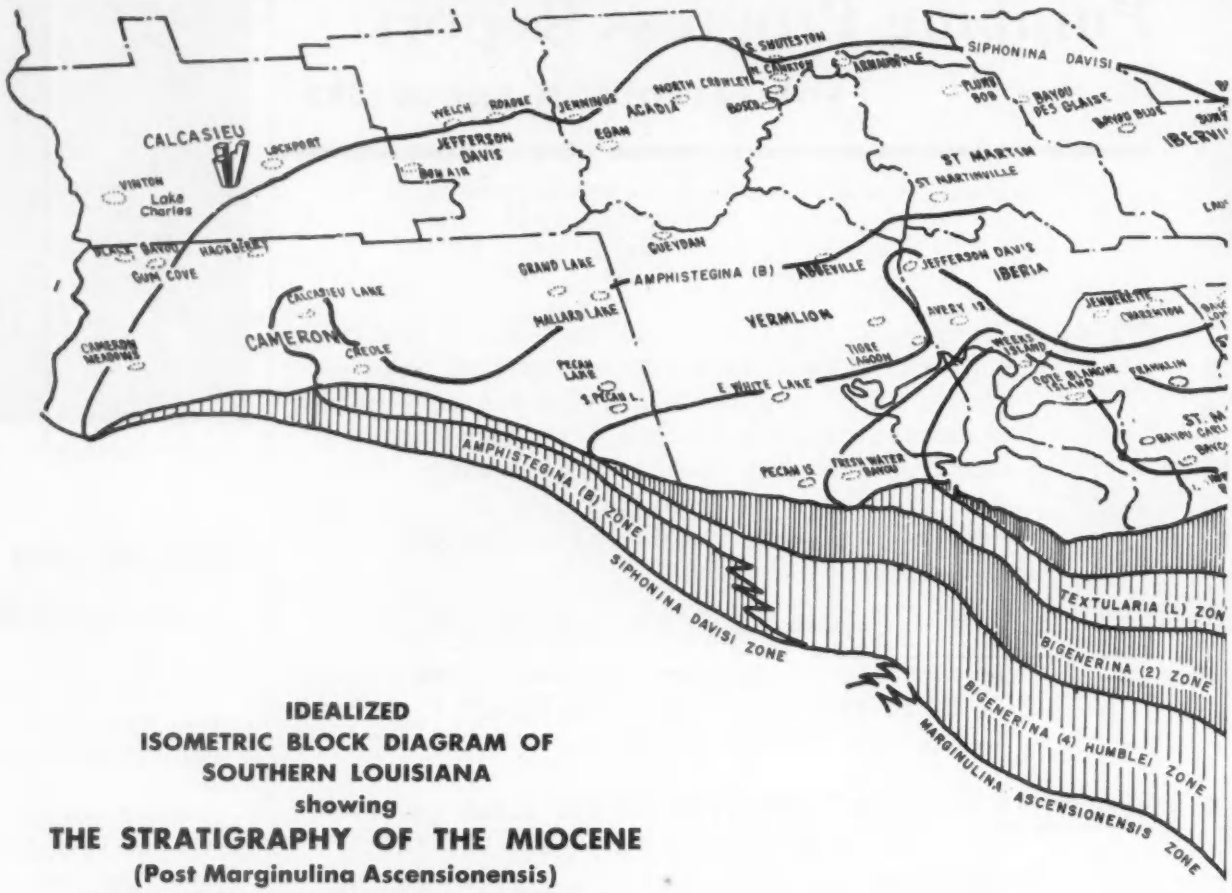
Smaller Foundations
Simpler connection with prime mover
Less floor space required
Reduced maintenance costs



Write today for Data Sheets describing the Direct Flow Pump Series.

THE ALDRICH PUMP COMPANY

Originators of the Direct Flow Pump
4 PINE STREET
ALLENTOWN, PA.
Representatives in principal cities



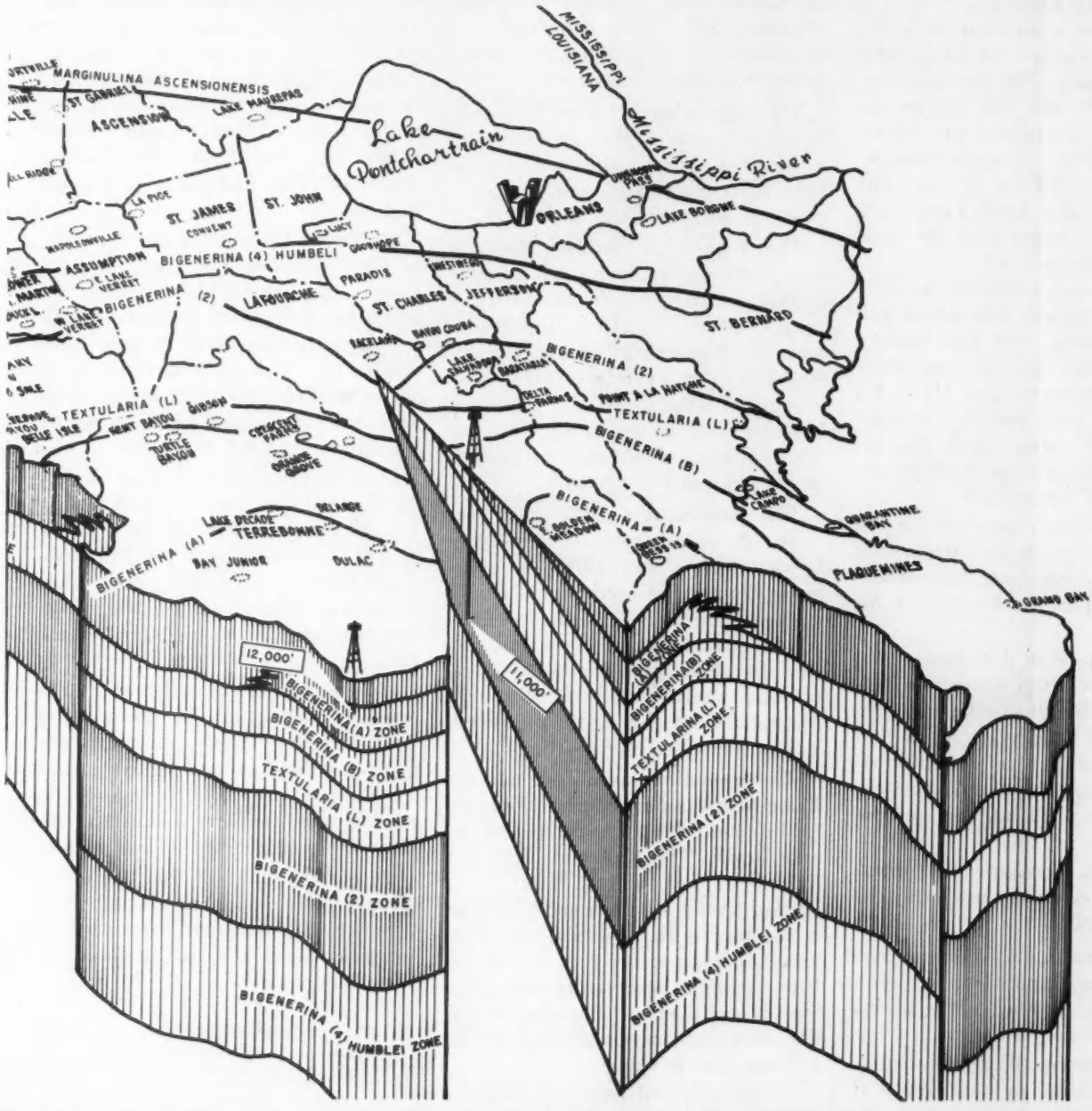
IDEALIZED
ISOMETRIC BLOCK DIAGRAM OF
SOUTHERN LOUISIANA
showing
THE STRATIGRAPHY OF THE MIOCENE
(Post Marginulina Ascensionensis)
Datum of Horizontal Surface: 7500 Feet

How Deep Is Miocene Production

The accompanying idealized block diagram provides a likely picture of what is available for production men to shoot at.

INSHORE AND OFFSHORE production in South Louisiana has turned all eyes in this direction. As more and more operators move to the bayou country, a need has arisen for information concerning the area. Geologists, geophysicists and engineers are working to try to fill in the gaps.

One group, the Lafayette Geological Society, realizing a need for a generalized section of Upper Miocene section of Southern Louisiana, formed a Sub-Committee on Stratigraphy. This group accumulated the following information which is being used



In Southern Louisiana?

by a majority of the companies involved in exploration work in this area.

The accompanying block diagram is intended primarily to show the stratigraphic sequence in the Miocene of South Louisiana in addition to providing a general idea of where individual zones can be used for regional subsurface mapping. This is accomplished by stripping off the upper 7500 feet of sediments and leaving a horizontal surface of minus 7500 feet below sea level.

The reason for this arbitrary plane is two-fold: (1) it is generally conceded that for fairly consistent reflections of structure in the Miocene of South Louisiana, very few, if any, horizons should be carried further up-dip than minus 7500 feet, and (2) due to facies changes, the more easily correlative marine shales, along with their foraminiferal markers, disappear rapidly above this point in most instances. Therefore, it is felt that the line shown in the horizontal component of the diagram for each zone (actually a minus 7500-foot contour) is a reasonable up-dip limit for pur-

poses of regional mapping.

The following is an example of the usage of the diagram: At Lucy field, southwest of Lake Ponchartrain, you may expect to find the Bigenerina (4) humblei outcropping just above minus 7500 feet, or approximately minus 7200 feet. Thus, if you went north and up-dip from Lucy field you would no longer find the zone since it was stripped off.

However, coming south from Lucy field towards Paradis you would still be on the minus 7500 foot surface and would cross the outcrops of all the section between the older Bigenerina (4) zone and the younger Bigenerina (2) zone, with the Bigenerina (4) zone dipping off to the south beneath the surface.

Continuing south from Paradis you would finally reach the Bigenerina (2) zone outcrop, on your minus 7500-foot surface, at Bayou des Allemands.

The zones used in this diagram are Miocene zones which are most widely employed by South Louisiana operators and the nomenclature is that which gradually has crept into popular usage. Regional correlations are from electric logs and/or paleontology.

Individually considered, youngest to oldest and down-dip to up-dip, the zones are as follows:

The Bigenerina (A) Zone derives its name from a species of foraminifera generally identified as Bigenerina (A) for floridana.

The Bigernerina (B) Zone is identified principally by the occurrence of a Bigenerina floridana variety.

The Textularia (L) Zone derives its name from a form variously identified by major companies as Textularia (L), Textularia articulata, or Spiroplectammina barrowi.

The Bigenerina (2) Zone is identified principally by the occurrence of a form variously called Bigenerina (2), Bigenerina nodosaria, and Bigenerina nodosaria var. directa.

The Bigenerina humblei Zone, a very widely used zone in regional subsurface mapping, is identified by a form variously called Bigenerina humblei, Bigenerina (4) and Bigenerina (3). **The Textularia (W) Zone** is only slightly above the Bigeneria humblei zone in an up-dip position and is often used as a regional marker in the place of Bigenerina humblei.

The Amphistegina (B) Zone receives its name from its identifying foram which is also called Amphistegina (2) and Amphistegina chipolensis. This zone is a well-defined regional marker to the west, but carries east as such only as far as a line running approximately between St. Martinville on the north and Fresh Water Bayou on the south.

The Siphonina davisi Zone and the **Marginulina ascensionensis Zone** are identifiable by their respective namesake fossils. The Siphonina davisi is well developed and is used as a marker to the west but becomes poor to the east. With respect to Marginulina ascensionensis, the reverse is true. Along a north-south line from St. Gabriel to Cote Blanche Island, the stratigraphic relationship of the two markers is vague.

It will be noted from the diagram offshore, that Marginulina ascensionensis extends further westward down-dip than up-dip. Actually, the Siphonina davisi zone, as such, extends up-dip only about as far as minus 8000 feet, and therefore is mappable only to that extremity; however, for uniformity with respect to the diagram, it was projected to the minus 7500 foot plane by extrapolation.

It should be pointed out that the vertical component of this block is purely diagramatic and therefore no effort has been made to indicate flexure cycles or hinge lines on individual zones. Nor has any attempt been made to differentiate between sands and shales and therefore no on-lap or off-lap relationship is shown.

Although no vertical scale is implied, it will be noted that a well bore, on the eastern edge of the cut-out wedge in the vicinity of Cut Off field, by 11,000 feet would have penetrated a section through Textularia (W), but not quite to the Bigenerina humblei.

By comparison, a well bore at the southernmost point of Terrebonne coast would probably just reach the Bigenerina (A) zone at approximately 11,000 feet to 12,000 feet and the rest of the Miocene would still be beneath it—how deep no one knows.

It will be apparent that not all of the producing fields are shown. Only a few were indicated for reference purposes along the up-dip limits of each zone.

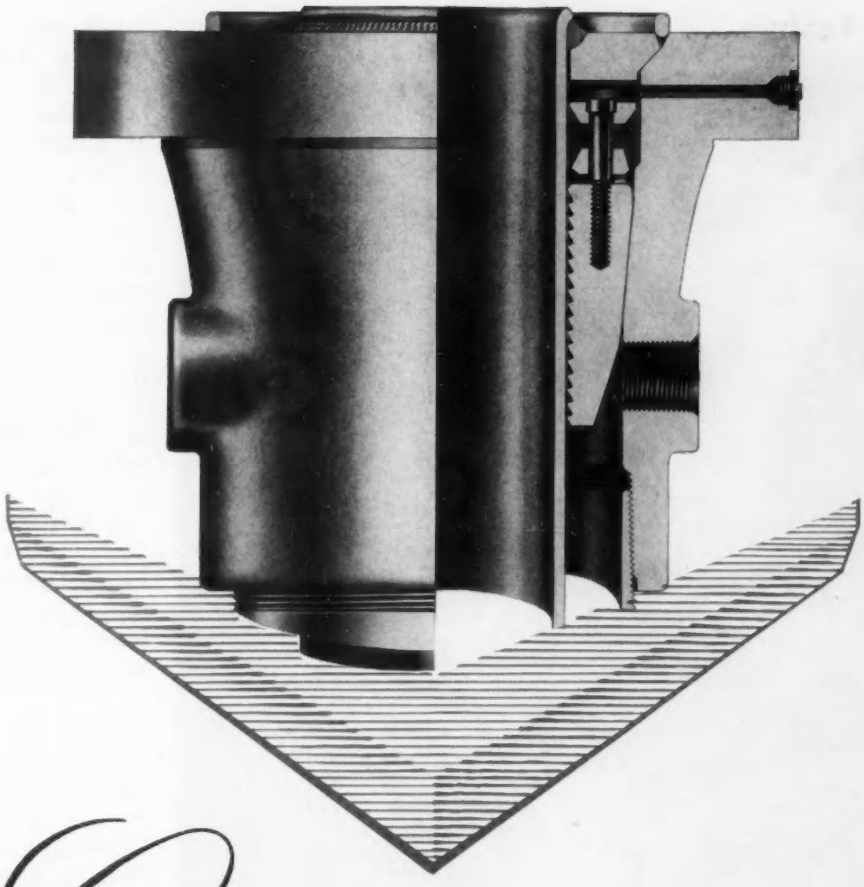
ACKNOWLEDGMENT

The authors wish to acknowledge the assistance of Professor Grover Murray, L.S.U., Consultant George May and Draftsman Jack Denny.

This article was prepared by the Subcommittee on Stratigraphy of the Lafayette Geological Society whose members include C. M. McLean, R. L. Beh, H. W. Curfman, K. R. Johnson and J. E. La Blanc.

Offshore Oil and Gas Map

A large-scale multi-colored separate insert folded map of the Texas-Louisiana Gulf Coast region accompanies some copies of this issue of WORLD OIL. It covers the offshore area and adjacent inland territory. The map shows such features as oil and gas pipe lines, oil and gas fields, and offshore lease ownership. The map is in copies distributed in the Texas-Louisiana-Mississippi area. Other subscribers can obtain the map free of charge by writing WORLD OIL, Box 2608, Houston 1, Texas.



THE *Cadillac* OF CASING HEADS

RECTORHEAD Casing Heads have achieved their place in the industry through the design of the Rector Welding Ring and application of API ring gasket which makes the metal-to-metal seal between strings possible.

This "ring-of-steel" seal not only simplifies high pressure casing head installation, but provides a seal that will not burn out, deteriorate, flow under high pressure or temperature, requires no maintenance or replacement, and eliminates pressure equalization between strings.

The 60,000 Rectorhead Casing Heads, with all-metal, welded seal, installed during the past 25 years, have been a vital factor in "Making the Oil Industry Safer."

Sold through authorized supply stores.

RECTOR WELL EQUIPMENT COMPANY INC

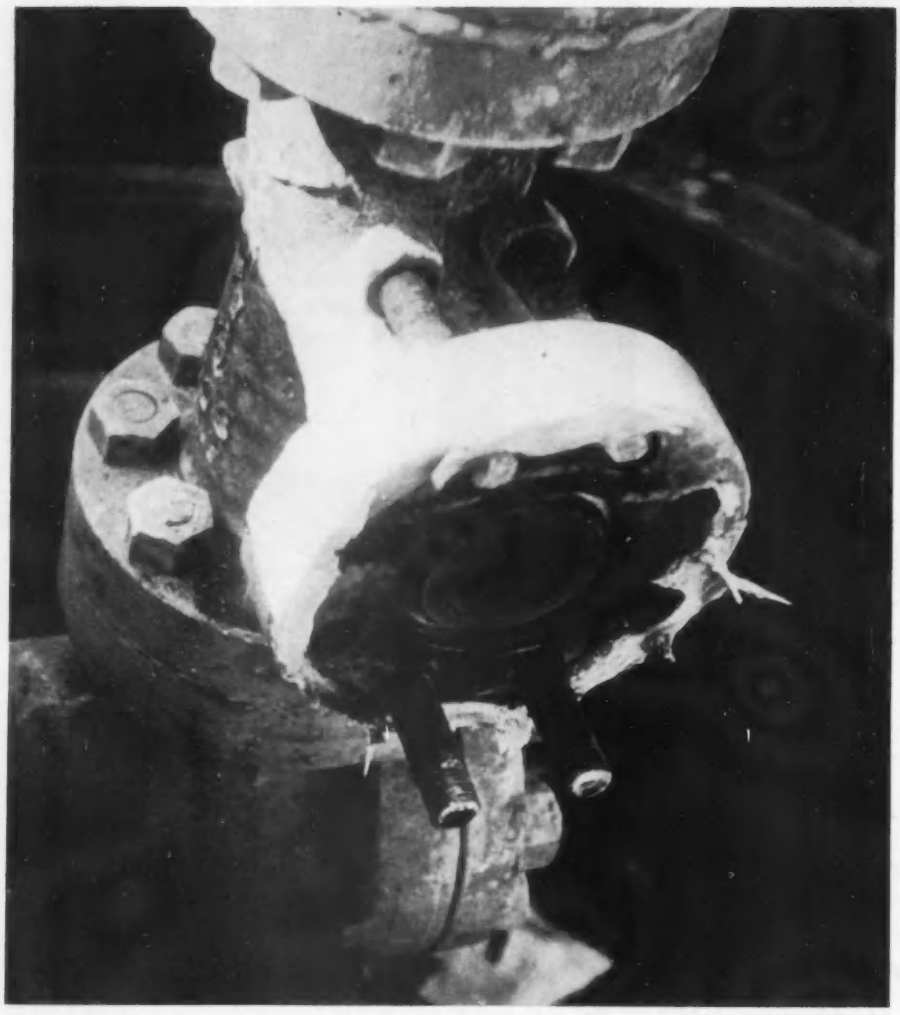
★ MAKING THE OIL INDUSTRY SAFER

1100 NORTH COMMERCE ST. FORT WORTH, TEXAS

Houston Plant: 2215 Commerce St.

REPRESENTATIVES IN ALL ACTIVE FIELDS

A Gulf Coast Feature . . .



This slightly discolored, zinc metalized wellhead shows no signs of corrosion after a year's operation in Corpus Christi Bay.

Metalizing Helps Lick Gulf Coast Corrosion

Excellent protection easily applied at a low cost per year makes metalizing a useful tool in corrosion prevention.

By F. W. GARTNER, JR.
F. W. Gartner Company
Houston

SEA AIR and salt spray may be invigorating to the tourist but to the petroleum industry and its allies along the Gulf Coast, it is slow death. This is not by any means an over-statement of the corrosion problem, which is one of the foremost considerations in Gulf Coast activity.

A tremendous amount of equipment is knee-deep in water along the thousands of miles of bays and bayous of the Gulf Coast. As the operating distance offshore increases, the problem becomes more acute and plausible solutions continuously are being sought. Paints, plastics, wraps and sprays have been used along with galvanizing processes, cathodic protection, and now metallizing which is being used to a greater extent by some of the producers.

Metallizing is a process by which metals such as monel, aluminum, zinc and others may be sprayed with the use of oxygen and acetylene on a properly cleaned surface. Although it may be applied to either concrete or metal surfaces, it is usually used with the latter.

The metallizing process is not so complicated that operators could not perform the task themselves. The most important factor in the process is surface preparation. This means a thoroughly cleaned and roughened surface obtained by sand blasting. When this has been achieved, the desired metal and its thickness are determined for the specific usage to which the equipment is to be subjected.

The most widely used sprayed metal coating in present use along the Gulf Coast is zinc. Metallized zinc coatings are sometimes referred to as sprayed galvanizing. A coat of .003-inch thickness provides 1½ ounces of zinc per square foot of surface and is comparable to the average galvanizing job.

Zinc, being strongly anodic to steel, will protect, cathodically, large voids resulting from physical damage to the coating. Its best use is in the pH range of 8-12.

Naturally, too thin a coat will reduce the expected life of the application, while too thick an application will cause cracking when the object is subjected to strain. A magnetic thickness gage may be used to make sure that the correct thickness of metal has been applied.

Reasonable proof of the effectiveness of zinc metallizing in retarding corrosion of oil field equipment is illustrated by what is thought to be the first such installation in the Gulf Coast area.

Five years ago, a zinc metallized christmas tree was installed on a well in Corpus Christi Bay. Today, that same christmas tree, still in operation, is completely free of any corrosion and has received no additional maintenance for corrosion prevention during this interval.

The metallizing job on this particular christmas tree is expected to be effective for a period ranging between 10 and 15 years. Condition of the tree at the present time indicates that this

estimate may have been a bit conservative.

Since this installation, many other applications have been found for the metallizing process to aid in the fight against corrosion on Gulf Coast equipment. Crew boats, production platforms, drilling platforms, tanks, pipe and risers all have been given the new lease on life through metallizing.

In applying any corrosion prevention system or material to equipment, an operator is interested in safety, cost and appearance. If the method is successful and retains the equipment in its original state, hazards of operation should not be increased. Likewise, appearance of the equipment should remain unchanged if the forces of corrosion can be retarded. Paints or plastics required for appearance, or as an aid to corrosion prevention, are applied easily to the metallized surface.

From the standpoint of over-all cost, metallizing maintains an advantageous position. If the corrosion preventative is applied while the structure is in the yard on shore, a metallized cost of zinc, .010 inch thick will cost approximately $1 to $1.25 per square foot.

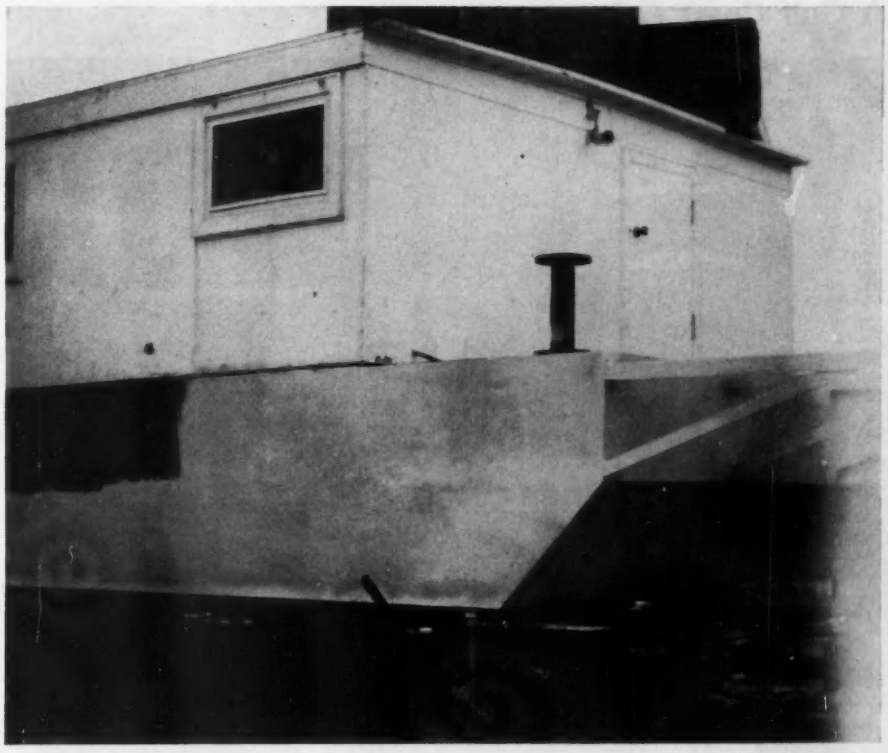
Four to six coats of vinyl covering ranges about 40 cents to 70 cents per square foot and has a lifetime less than half that of a metallized covering when submitted to like conditions.

Galvanizing costs vary with the weight of the object being dipped, and run approximately .05 cent per pound. This process usually provides a metal coat of from .003-inch to .005-inch thick. Average effective life in salt water conditions is approximately five to six years.

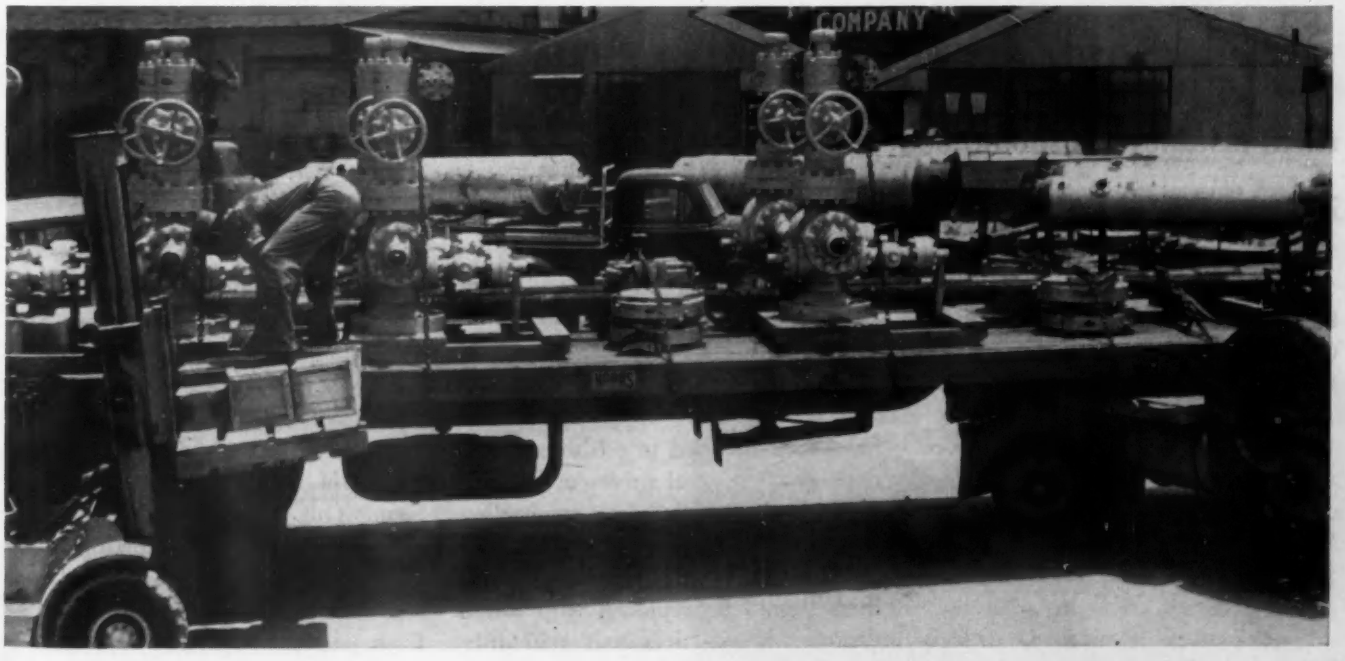
Tar wrapping methods also are extremely variable as are their costs. Their life expectancy under conditions similar to those considered above, however, should extend from two to four years.

These figures are approximations being dependent upon a number of factors. The picture they present, however, indicates that the metallizing process has a definite place in the corrosion prevention program being carried out in the Gulf Coast area.

—The End



Barges of all types benefit from zinc metalizing. Here a small Gulf Coast barge receives a coating of zinc at Chocolate Bayou.



A load of metalized oil field equipment protected by a zinc coating leaves for installation along the Gulf Coast.

A Gulf Coast Feature . . .

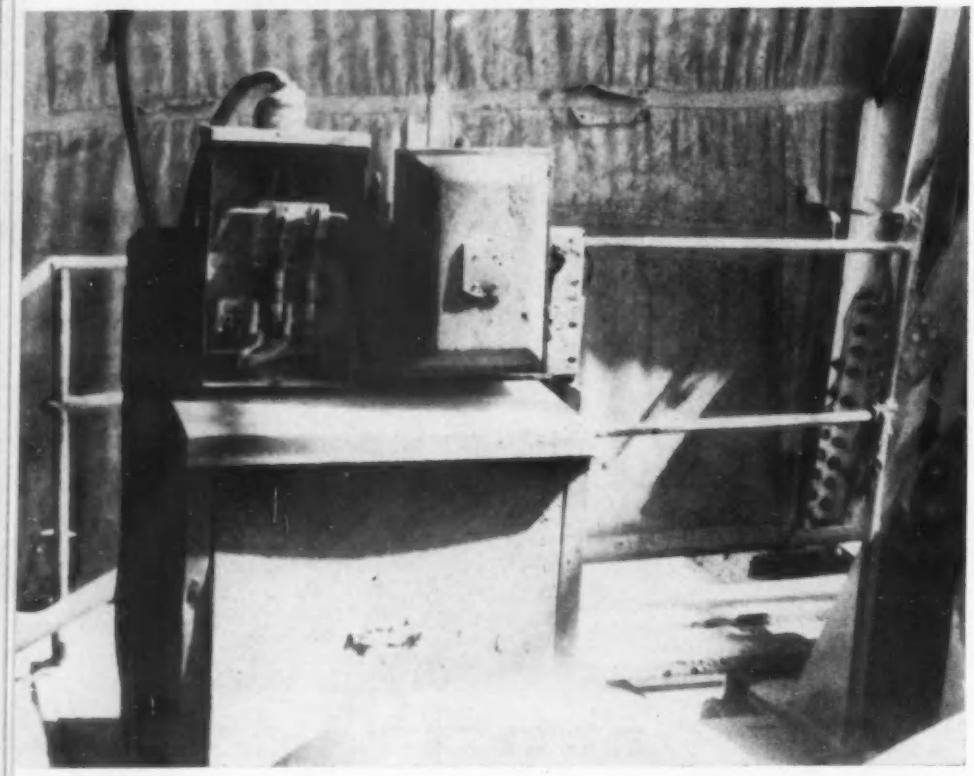


FIGURE 1—This uncovered switch was located directly on the floor of an offshore platform. A million-dollar rig and several lives vs. the cost of a new switchbox.

Don't Short Circuit Your Offshore Operation

The hit-or-miss methods so often used in electrical installations should be replaced with sound engineering standards and practices.

By O. E. LUNDELIUS, JR.
Crouse-Hinds Company
Houston

WITH DEVELOPMENT of offshore oil and gas resources now in a headlong dash to take a major role in the petroleum industry, a sometimes neglected phase of offshore operations has been spotlighted—electrical installations.

Since passage of the tidelands legislation in 1953, millions of dollars have been diverted to offshore operations. But a general survey of offshore facilities reveals some astounding facts. The hit-or-miss methods so often followed in electrical installations should be replaced with sound engineering practices and standards. There is a definite need for experienced electrical engineers to insure proper design of electrical facilities in offshore operations.

To more fully understand the problems, first consider the basic types of structures used in offshore operations:

- Non-self-contained stationary drilling platforms.
- Self-contained stationary drilling platforms.
- Self-contained mobile drilling platforms.
- Production platforms.

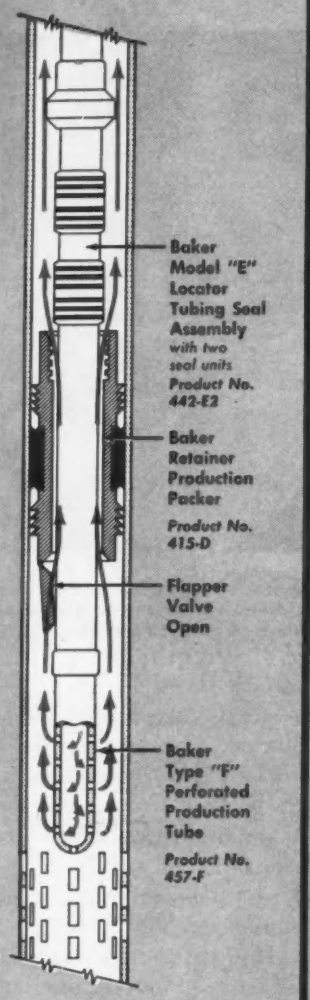
Regardless of its function, every structure faces certain common problems relative to the electrical system, the more important being severe salt atmosphere corrosion, potential hazardous concentrations of flammable gas and vapor, and compliance with Coast Guard regulations.

Figure 1 shows how electrical equipment on some earlier platforms was selected without apparent regard for either the corrosive conditions or hazardous atmospheres encountered. The sheet steel enclosed switches shown are located directly on the drilling platform. Continued exposure to the saline atmosphere and spray resulted in deterioration of the cover of one switch to a point at which it could no longer be maintained in place.

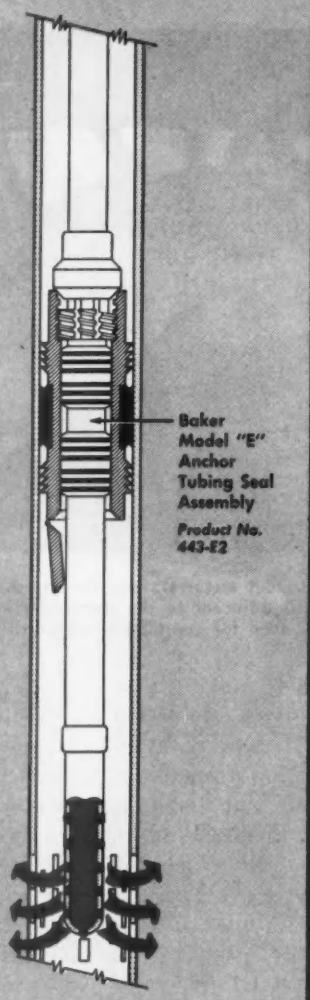
Figure 2 shows another misapplication of equipment, a direct current motor controller. Though not readily visible here, the condition of electrical components within the sheet metal housing is extremely poor, with heavy corrosive deposits on all metal parts. Aside from the explosion hazard involved, the use of such equipment in these circumstances obviously presents costly and difficult maintenance problems.

The tremendous investment involved in offshore structures, together with the high cost of shutdowns due to equipment failure, has forced some realization of the necessity for utilizing more adequate electrical apparatus.

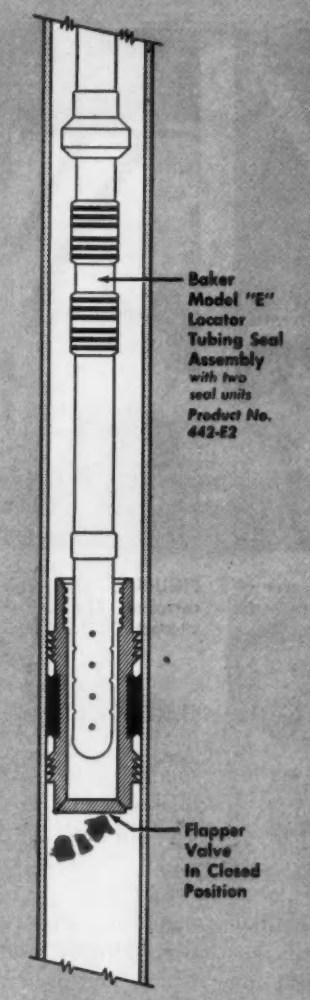
Shown in Figure 3 are two explosion-proof and weather-resistant motor starters used on the shale shaker of a recently-completed platform. This represents a definite advance in coping with corrosion and explosion problems. It should be noted, however, that complete safety from possible internal explosions is still questionable because of the ap-


Baker Model "E" Locator Tubing Seal Assembly with two seal units Product No. 442-E2
Baker Retainer Production Packer Product No. 415-D
Flapper Valve Open
Baker Type "F" Perforated Production Tube Product No. 457-F

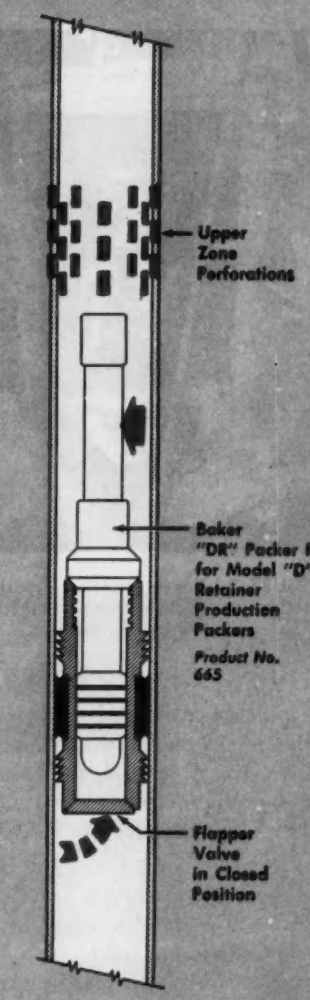
Washing or Circulating—Seals of Locator Tubing Seal Assembly removed from packer bore. Flapper Valve held open by tubing extending below the Packer.



Pressuring Below Packer—Acid or cement squeeze, formation fracture, gas or water injection. Anchor Tubing Seal Assembly is used when high squeeze pressures are required.



Isolate Zone Below Packer—Tubing String removed, Flapper Valve closed. Isolates pressure differentials (squeeze, production) from below the packer.


Upper Zone Perforations
Baker "DR" Packer Plug for Model "D" Retainer Production Packers Product No. 665
Flapper Valve in Closed Position

Temporary Bridge Plug—For working over zones above the packer. DR Plug is run in on Baker Retrievable Cementer and retrieved with overshot.

PACKS-OFF AND HOLDS UNDER HIGH BHT—Baker Retainer Production Packers will hold high pressures under conditions of high temperatures. Hundreds of Baker Packers are in successful service in Southwest and Gulf Coast areas where temperatures in excess of 300 degrees are not uncommon.

RESISTS CORROSION—The cast-iron used in the construction of Baker Packers is far more resistant to corrosion than the casing in which the packer is set, thus making it ideal for permanent installations, or for use in areas plagued with a severe corrosion problem.

EASILY DRILLABLE—The Baker Packer is constructed of drillable cast-iron, and its design supplements the breaking-up action of the bit. Whether it has been in the well for only a few hours, or for ten years, the Baker Packer can be drilled up in minimum time. Expensive and hazardous "milling-out" operations never are required.

IMPORTANT FACTS

Baker Packers are used in a majority of installations where conditions of extreme pressure, temperature, or depth are present. Baker Packers also dominate Dual Zone installations, particularly those involving two-packer, crossed-flow arrangements.

BUT IT IS ALSO TRUE that *more* Baker Packers are used for *simple single zone* completions than for *any other type of completion*, and that *most* Baker Dual Zone installations employ *only one* packer.

Ask any Baker representative, or office, for complete details. There is no charge, and no obligation, for specific recommendations and completion planning advice available from Baker Technical Advisers. Why not be prepared for your next completion?

BAKER OIL TOOLS, INC.

HOUSTON • LOS ANGELES • NEW YORK

If your well is worth completing . . . it's worth completing well

BAKER

RETAINER PRODUCTION PACKER

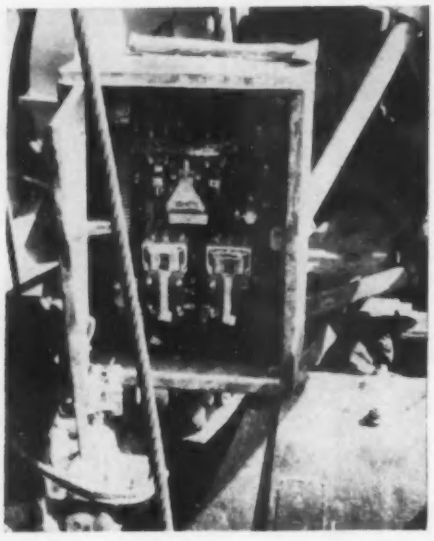


FIGURE 2—Heavy corrosion deposits cover all metal parts resulting in costly maintenance and explosion hazards.

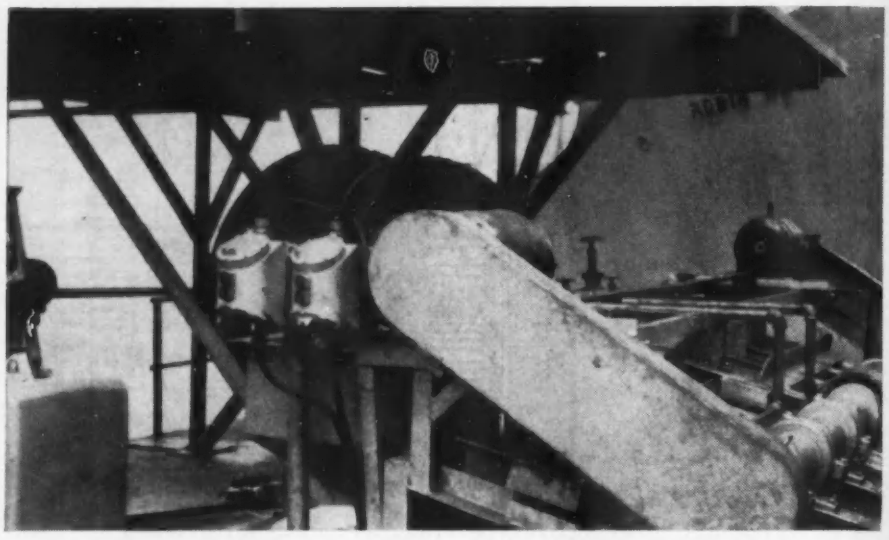


FIGURE 3—The explosion-proof motor starters on this shale shaker are designed to cope with corrosion. The lack of seals adjacent to the starters, however, destroys their explosion-proofing characteristics. There is a need for experienced electrical engineers in equipping offshore units.

parent lack of seals adjacent to the starters. Unless all wiring entrances are properly sealed, the use of explosion-proof housings does not constitute a completely safe installation.

In the search for a solution to the problem of corrosion, extensive laboratory and field tests of cast fittings and enclosures made of a highly refined copper-free aluminum alloy indicate a high resistance to sea water corrosion. An example was revealed in the examination of a floodlight which had been in operation on an offshore structure for approximately two years. Though lack of maintenance was indicated by the almost opaque condition of the lens due to salt deposits, the cast housing and small parts made of the copper-free aluminum alloy were in excellent condition. This is in contrast to previous experience with ordinary commercial grade alloys containing percentages of copper when subjected to similar corrosive situations.

It should be emphasized that care must be taken in the selection of such equipment to ensure that the alloy employed is entirely free of copper content and that small parts, such as screws and operating shafts, are also corrosion resistant, being either of the same quality aluminum or stainless steel. The present availability of fittings and enclosures meeting these requirements, together with their relatively moderate increased cost over standard material, should prompt serious consideration of their use in offshore operations.

Requirements recently established by the U. S. Coast Guard with respect to safety of life and property on offshore structures are contained in the Code of Federal Regulations, Title 33, Sub-chapter N, which becomes effective July 1, 1956. This regulation does not include obstruction lighting and warning devices, which are presently under the jurisdiction of individual Coast Guard district commandants, nor does it apply to operating equipment and methods employed.

Basically, two of the requirements included in this over-all safety regulation are of interest here.

The first requires that artificial light be provided at all personnel landings and establishes a minimum value of such illumination at one foot-candle. Since landings are a considerable distance below the platform level, the use of floodlights installed on the platforms above the landings appears to offer the best means of compliance with this requirement.

The second requisite concerns the installation of a general alarm system for all manned structures which must be audible in all parts of the platform. It is logical to suggest that such an alarm system consist of explosion-proof components, since its operation would occur during abnormal conditions at which time hazardous concentrations of gas and vapor would be most likely to exist.

Requirements governing obstruction lighting and warning devices as aids to navigation are divided into three classifications by the Eighth Coast Guard District, which has jurisdiction over the Gulf Coast area.

Class A requirements, which are the most stringent, will apply to the majority of locations, and will be the only class considered here. Under this regulation, any structure having a dimension of over 50 feet on any one side, must have an obstruction light at each corner. These lights are required to be Coast Guard approved, and are of the 360-degree fresnel lens type, operating normally on a low voltage battery supply. All lights must flash in unison, showing at least 60 flashes per minute with each flash of 0.3 second duration. On unattended structures, each light must be equipped with an automatic lamp changer to ensure continuous operation.

In addition to obstruction lights, each Class A structure is required to have a fog signal approved by the Coast Guard. This signal consists of four air horns mounted on a manifold in a horizontal plane with the axis of each horn 90 degrees apart. These horns operate at 100 pounds pressure and must automatically sound a 2-second blast every 20 seconds during periods of limited visibility, with emergency manual operating means available in the event of failure of the automatic control. A package fog signal incorporating the aforementioned features and including a dual source of power is avail-

SAVE 000

Use the Orbit Venturi Tubing Wing Valve in place of a 2″ Full Opening Valve to reduce the cost of your Christmas Tree.

Write for Bulletin on Orbit Valves for Tubing Wing Service.

- Reduced cost
- Reduced weight
- Low operating torque
- Reduced wear and tear on the choke
- More control
- Greater safety factor
- Built for continuous heavy duty service
- Available through your favorite Well Head Manufacturer

The Orbit Venturi Tubing Wing Valve is designed for use where a full straight flow is not required.

Available in size 2″ x 1″, Stainless Trim only, API Flanges, Unibolt Hubs or GRALOC* Hubs, Working Pressure of 2000 lbs., 3000 lbs. & 10,000 lbs. End to end dimensions are special.

ORBIT VALVES®

ORBIT VALVE COMPANY

P. O. BOX 699 • TULSA, OKLAHOMA

*Registered Trade Mark

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

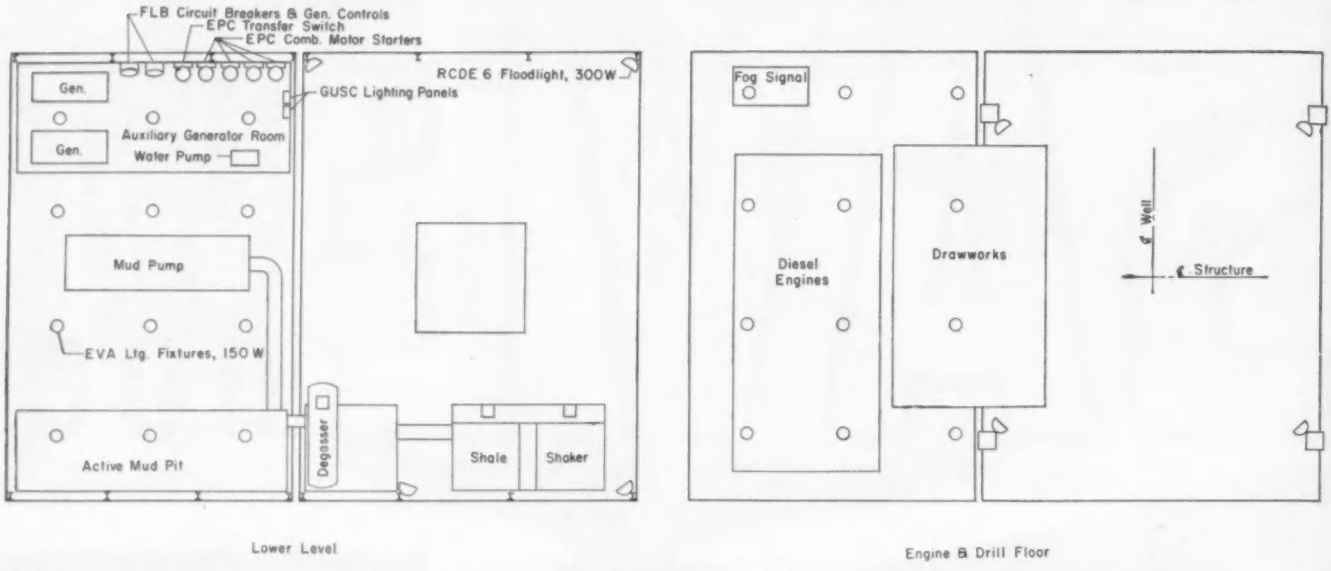


FIGURE 4—Plan of non-self-containing stationary drilling platform.

able for both hazardous and non-hazardous locations.

With general requirements and Coast Guard regulations covered briefly in the foregoing, now examine the various distinct types of offshore structures. It is acknowledged that probably no two platforms of any given type will be exactly alike; indeed, there are wide variations in arrangement and construction. The examples to be cited should therefore be considered average with respect to exact location of equipment.

Figure 4 illustrates in simplified form the deck plans of a two level non-self-contained stationary drilling platform. Rotary drive and drawworks are located on the upper level or drill floor, with other equipment, such as mud pumps, shale shaker, mud pit and auxiliary generators below. A structure of this type requires the use of a constantly attending vessel, or tender, to provide crew quarters; mess facilities, and storage space for such items as pipe, mud, cement, and fresh water. Normal electric power is provided by generators aboard the tender, with auxiliary generators and transfer switch on the platform.

Because of the imminent possibility of the presence of gas and combustible vapors over the area of the lower level, it is recommended that all electrical equipment located thereon be of the explosion-proof type. This applies to lighting fixtures as well as motors and arcing devices, since arcs which result when a lamp base becomes loosened in its socket by constant vibration present a serious explosion hazard.

Explosion-proof motor starters, circuit breakers, lighting panels and generator controls are shown grouped on a mounting rack in the auxiliary generator room. Generators themselves must be suitable for use in hazardous areas or modified to provide complete protection. A possible way to accomplish this would be to enclose each generator in a metal housing and force clean outside air through the enclosures. Because of the salt atmosphere encountered, such pressurizing air should be first passed through a dehumidifier.

Inasmuch as equipment on a stationary platform must be disassembled upon completion of a well in order to be removed to another location, most wiring systems presently consist of portable rubber covered cable. Considering the semi-portable nature of these installations, such a system seems to present the only practical approach and should provide sufficient safety if properly installed.

The cable utilized must be designed for extra hard usage as specified in Article 500 of the National Electrical Code and must contain a ground conductor in addition to circuit conductors. Thorough planning and careful installation are necessary to assure protection of the cable from mechanical injury. Inspection of several structures indicates that this need for mechanical protection of cables is frequently overlooked, implying a lack of sufficient planning of the electrical system.

Referring still to Figure 4, it is seen that virtually no electrical equipment is located on the upper level other than lighting and the required fog signal. The question of whether rig lighting should be explosion-proof has long been a controversial one in the case of both land and offshore rigs. Although the chance of hazardous atmospheres existing above the drill floor level is probably more remote than at the lower level, the owner's investment is certainly more fully protected by the use of explosion-proof lighting units.

Figure 5, depicting an explosion-proof 500 watt floodlight on a newly built platform, indicates the safety-conscious thinking of at least one offshore operator.

Next consider the self-contained stationary drilling platform, as outlined in Figure 6. For the sake of brevity, use this illustration to represent the layout of a mobile unit as well as the stationary. Basic requirements for each are much the same, although arrangement of components may vary considerably.

Here, in addition to the equipment required on the non-self-contained platform, are found crew quarters, all necessary storage facilities, and, frequently, a helicopter landing area on the roof of the quarters building. Since the hazardous conditions surrounding the drilling and mud-handling areas are the same as outlined

You'd be in a pretty pickle...

In times of plenty or in times of scarcity—in boom times or slack times—near the center of activity or in isolated locations—you would be in a pretty pickle if you didn't have the Supply Industry at your service.

The Petroleum Industry is operating at a record-breaking clip. Could such activity be sustained without our present-day Supply Industry?

The Supply Industry is your indispensable partner. Support it by purchasing all of your requirements ". . . THROUGH YOUR SUPPLY STORE."

LARKIN PACKER COMPANY, INC.
WAXAHACHIE, TEXAS

LARKIN
...Through Your Supply Store

PESA
PARTNERS IN PETROLEUM PROGRESS

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

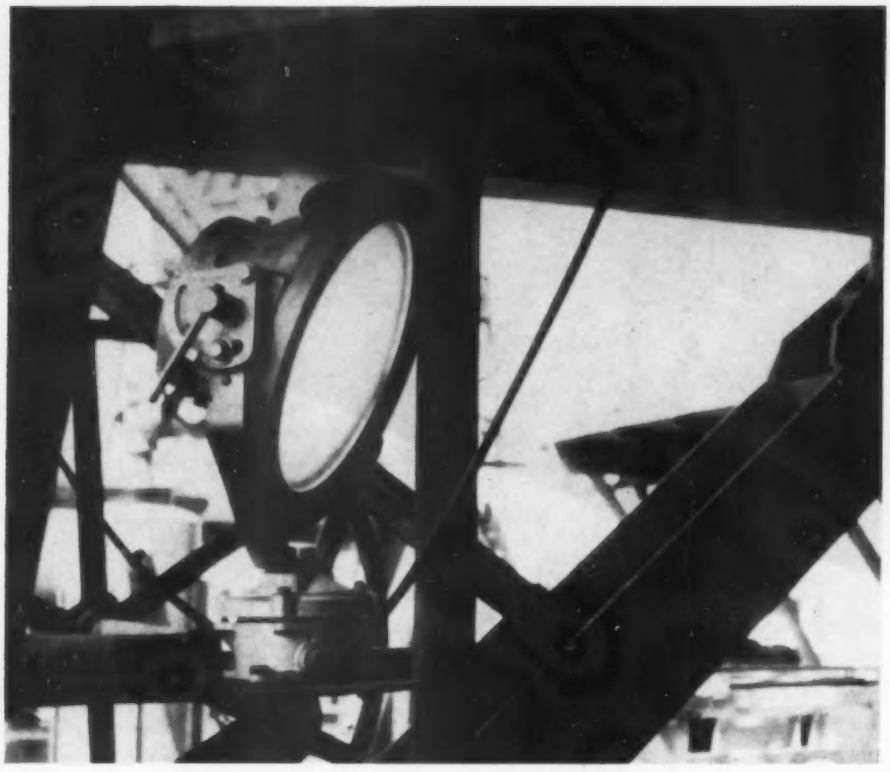


FIGURE 5—A safety-conscious offshore operator protects his investment and his workers by using explosion-proof floodlights where necessary.

About the Author

O. E. LUNDELIUS, JR., who received a B.S. degree in electrical engineering from the University of Texas in 1947, began his business career the same year in the engineering department of Brown & Root, Inc. He joined Crouse-Hinds Company in 1949, and resumed his position with them in 1954 after serving three years with the U. S. Army. He is an associate member of the American Institute of Electrical Engineers.

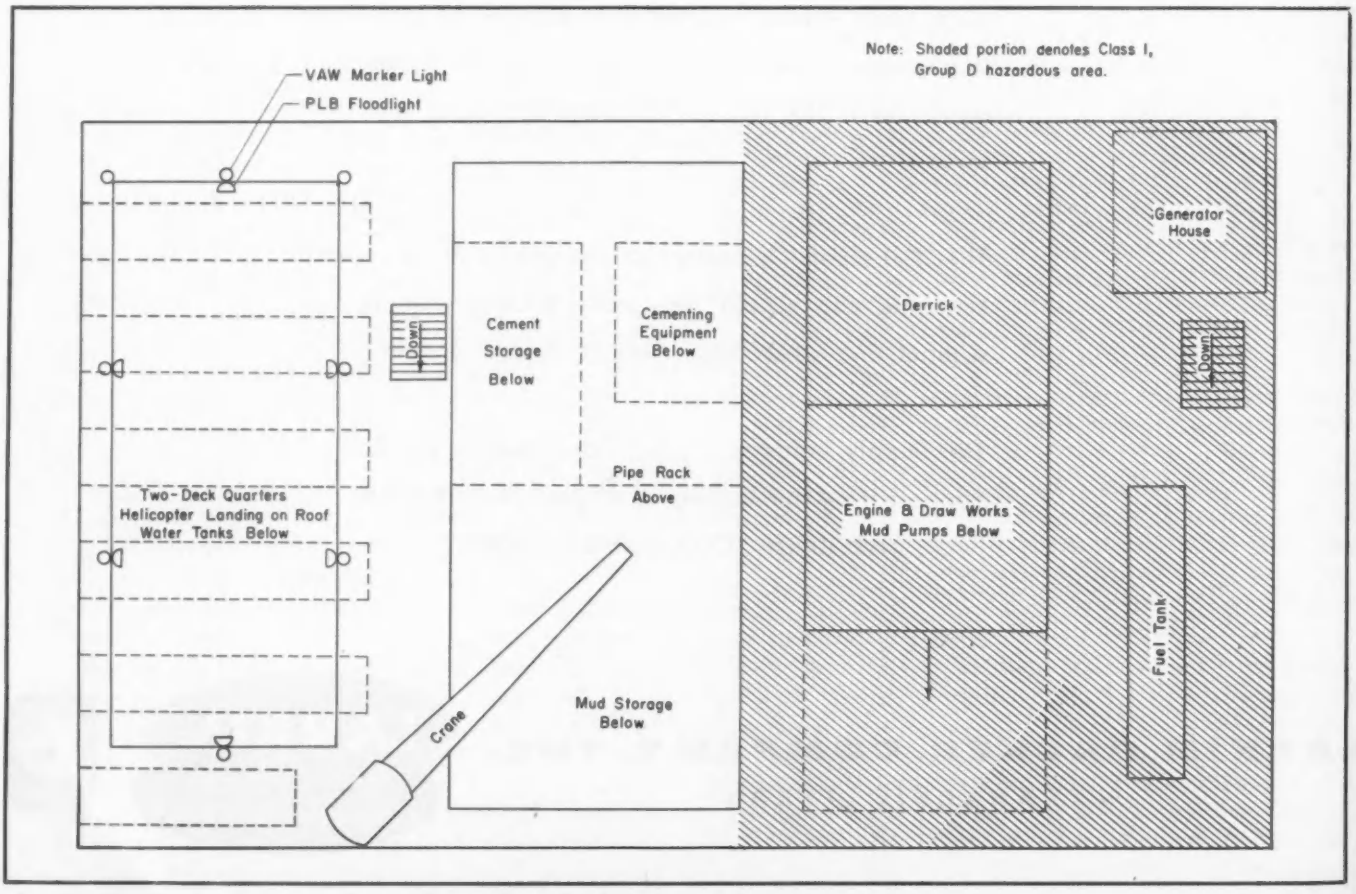


FIGURE 6—Plan of self-contained drilling platform.

JONES
SUCKER RODS
last longer!

Where life hangs by a thread! A sucker rod string is only as strong as its weakest joint. The latest models of automatic machines are used to accurately thread Jones rods and couplings to close tolerances well within API specifications.

Examine and compare the make-up of a Jones joint. They make up well, fit tight, endure and support continuous heavy loads. There are none finer.

LOOK FOR THE GREEN RODS

P·E·S·A PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION PARTNERS IN PETROLEUM PROGRESS

THE S. M. JONES COMPANY *Division of Buffalo-Eclipse Corporation*

General Office and Factory: **TOLEDO, OHIO** Sales Office: Kennedy Building, **TULSA, OKLAHOMA**

Export Sales Representatives: IDECO—Division of Dresser Equipment Company, Republic National Bank Building, Dallas, Texas and Chanin Building, New York City

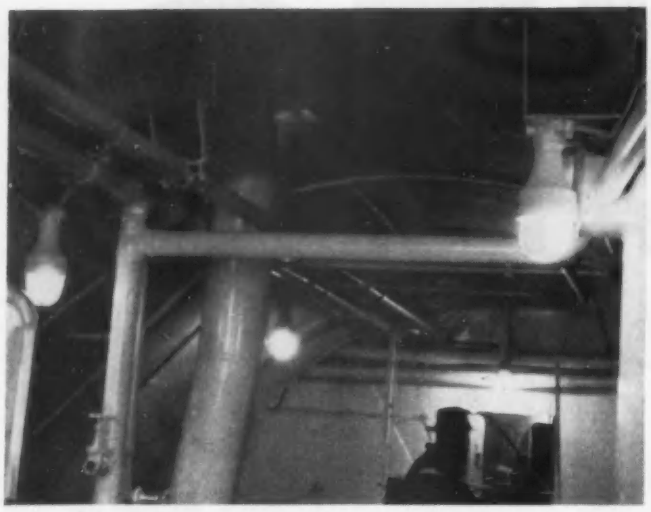


FIGURE 7—This totally-encased mud tank compartment is protected by vapor-tight lighting units.

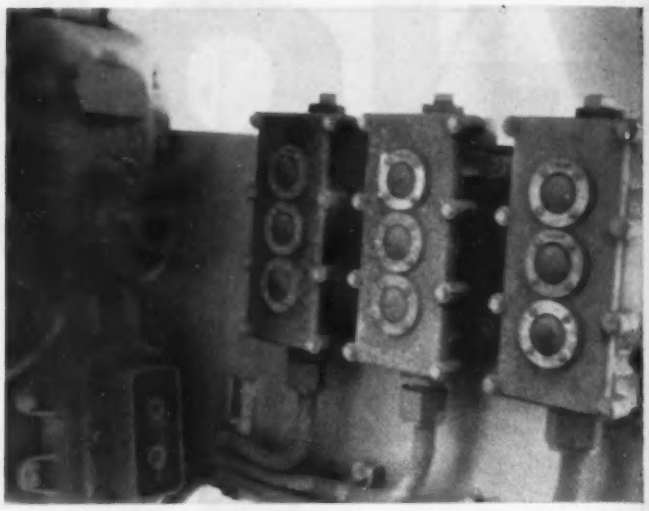


FIGURE 8—Inconsistency in using explosion-proof equipment adjacent to conventional equipment shows more planning needed.

for non-self-contained platforms, the cross-hatched portion of Figure 6 indicates that these areas should be equipped with explosion-proof electrical equipment. It is assumed that the platform design includes sufficient deterrents to the passage of gas and vapor, in the form of bulkheads and other obstructions, to limit the hazardous area to that shown.

Crew quarters and associated domestic services, such as galley, recreation, and air conditioning facilities, are located as remotely as possible with respect to the hazardous area in order to minimize special requirements and provide maximum personnel safety. The electrical installation in these areas will be of conventional type, but should be suitable for marine application since conditions here are essentially the same as found on shipboard.

Lighting of the helicopter landing area consists of aviation outline marker lights spaced at 20-foot intervals around the perimeter, and 200 watt floodlights for area illumination. Although at last report no CAA standard had been established for helicopter landing field lighting, the color of the marker lights is normally blue. Floodlights are the fresnel lens type providing a wide horizontal beam spread and a narrow vertical spread which allows the fixtures to be mounted at a low elevation to prevent creation of flight hazards.

For illustrative purposes, examples of various electrical components found on one type of mobile drilling platform are shown in the next three photographs.

Figure 7 shows explosion-proof lighting in a totally enclosed mud tank compartment, a definitely hazardous area.

In Figure 8 is shown a group of control stations and a motor starter located immediately outside the mud tank compartment. This particular installation is inconsistent to the extent that the starter and one control station are explosion-proof, while three other control stations are not, indicating the need for more thorough planning by experienced electrical designers. (It probably can be assumed that this was not intended as an explosion-proof installation, since no seals were used).

In Figure 9 are found a group of combination motor starters together with a panelboard located in the machinery room. Note that here a shipboard type of wiring system utilizing marine cable is employed.

The three foregoing illustrations point up one major difference between mobile and stationary platforms; namely, that the electrical installation on the mobile unit is permanent, as it is on other types of floating vessels, whereas on the stationary structure it must be dismantled for each move to a new location.

We come now to the last of the

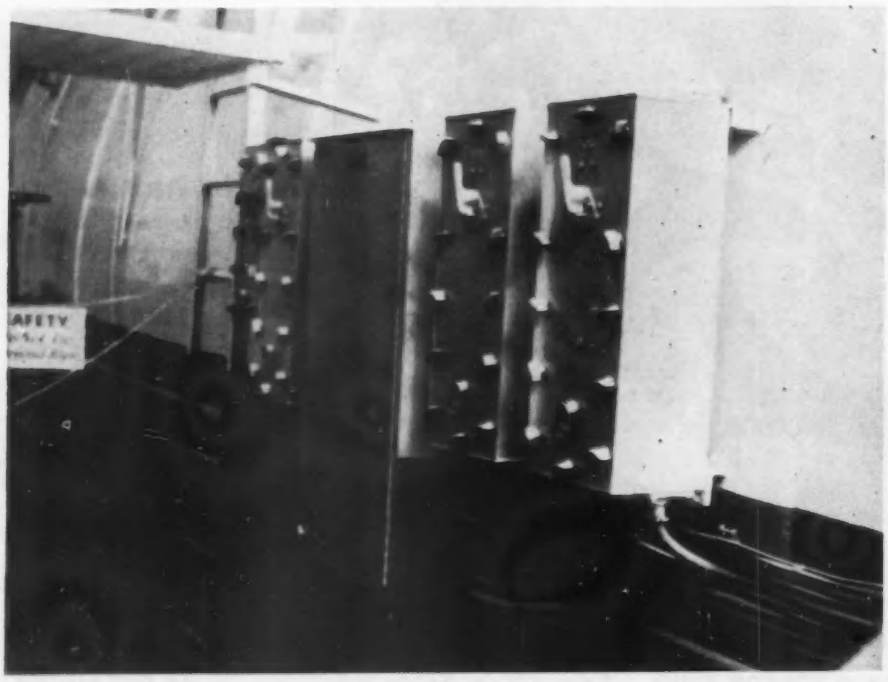
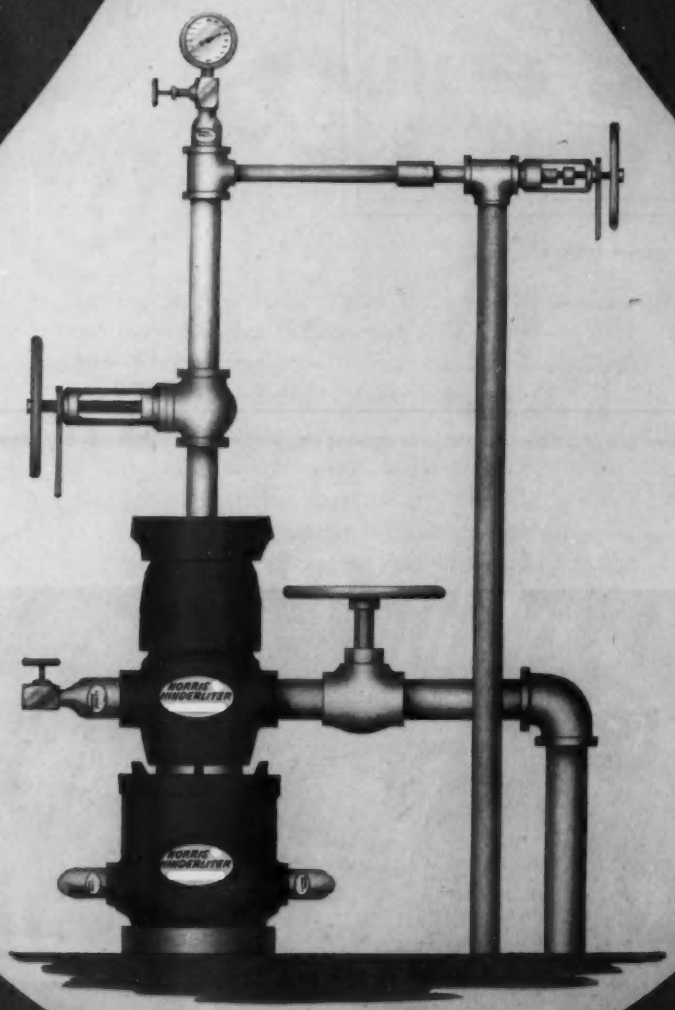


FIGURE 9—A proper installation in a machinery room using marine cable looks good and is a safe unit to operate.

If OIL is Your Business...

You Need NORRIS-HINDERLITER WELL HEAD EQUIPMENT



Your SUPPLY STORE IS OUR DISTRIBUTOR

W.C. NORRIS MANUFACTURER, INC.

TULSA, OKLAHOMA

BRANCHES:

GREAT BEND, KANSAS; CORPUS CHRISTI, HOUSTON, KILGORE, ODESSA, WICHITA FALLS, TEXAS; OKLAHOMA CITY, OKLAHOMA SALEM, ILLINOIS; CASPER, WYOMING;

Since NORRIS 1882

WEST COAST DIST.: REPUBLIC SUPPLY CO. OF CALIF., LOS ANGELES

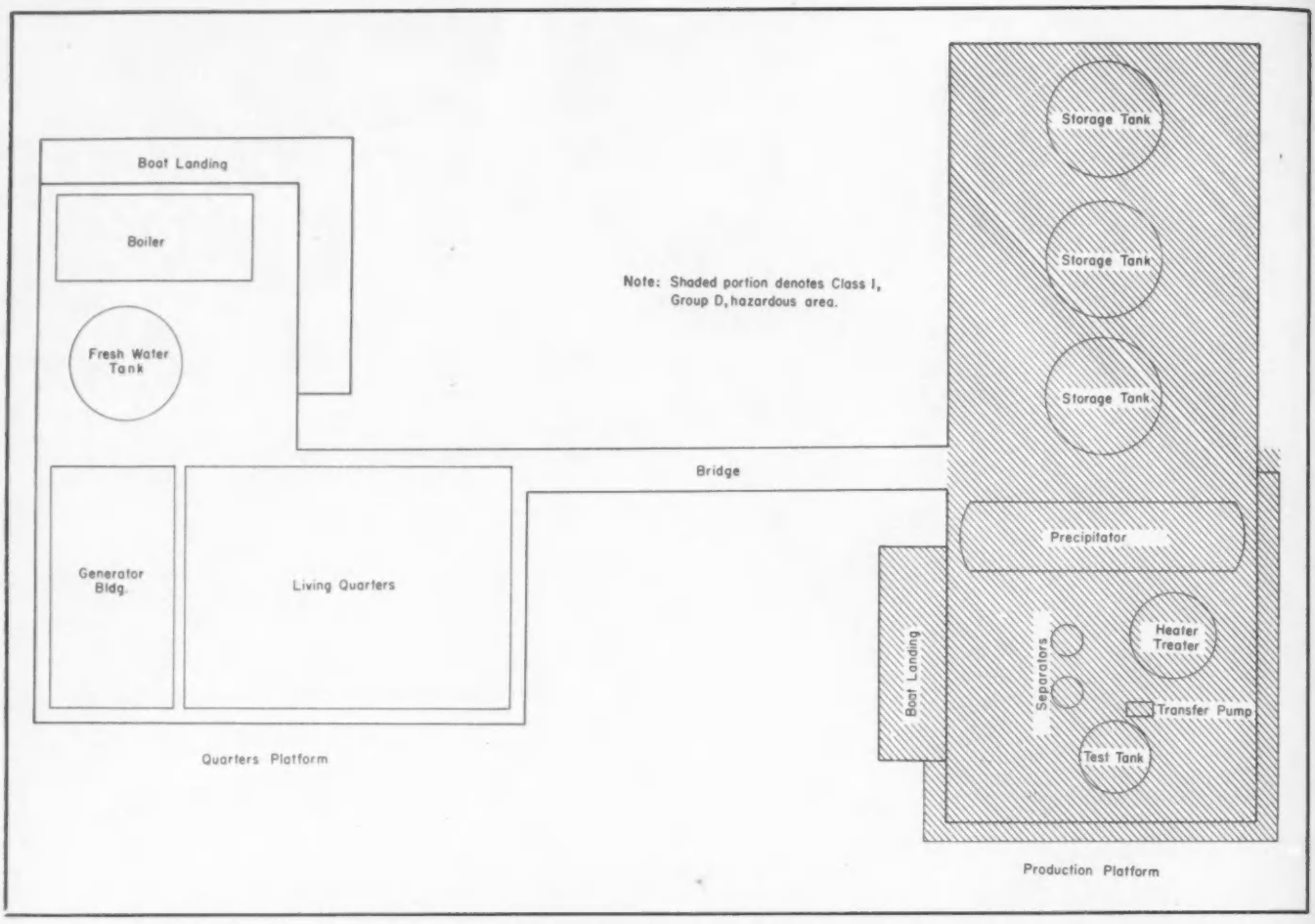


FIGURE 10—Plan of production platform showing the separation of hazard and non-hazard areas as a safety precaution.

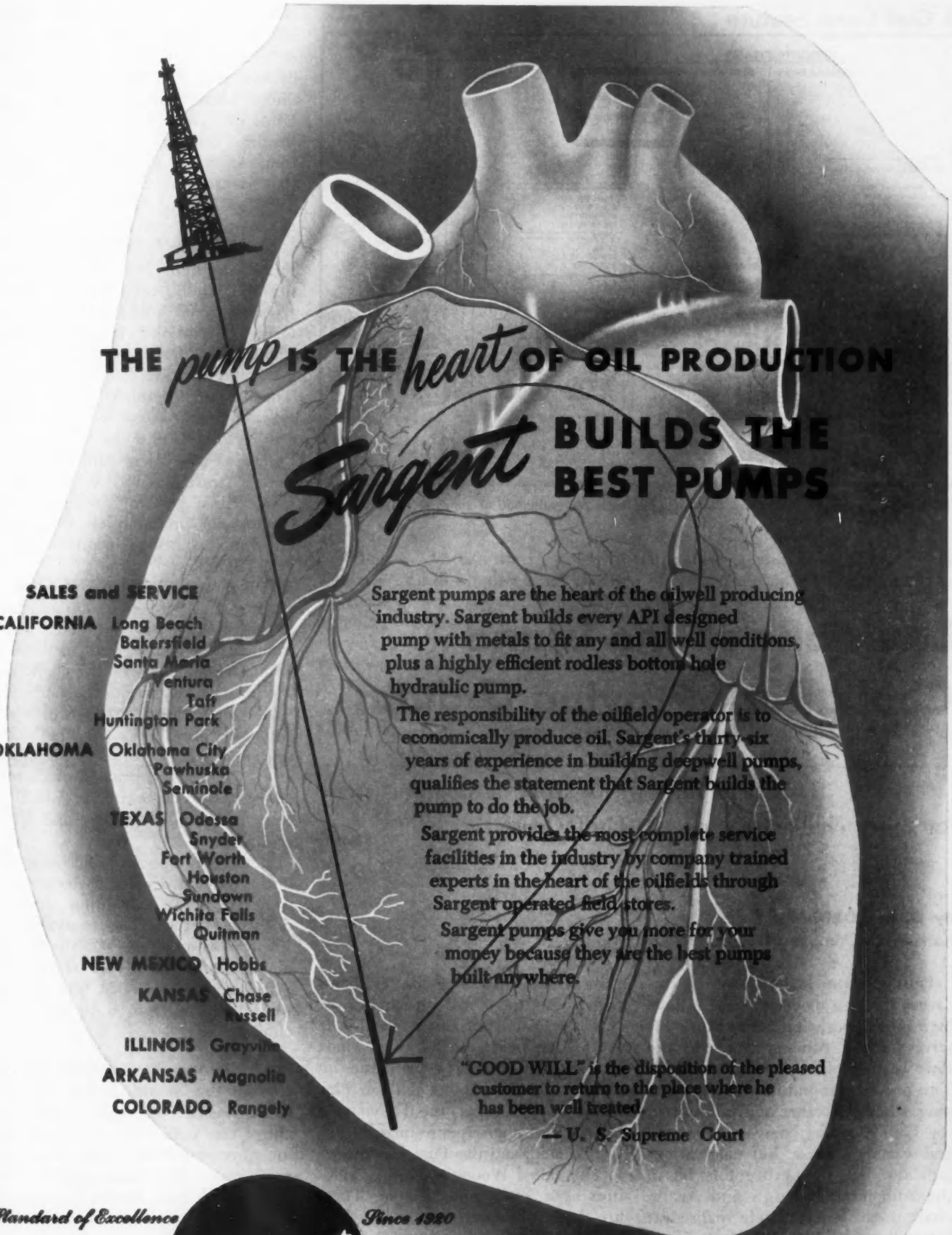
FIGURE 11—That unprotected light bulb could spell disaster. Proper design and installation is only part of the picture; improved maintenance is another.

basic platforms mentioned earlier, the production unit, shown in Figure 10. The structure chosen for illustration consists of two separate platforms connected by a walkway, one containing the production equipment and the other living quarters, boiler, and generator building. This type structure is, of course, permanently located in a producing field.

The electrical system on the production platform is, therefore, essentially the same as on a similar land based facility with special attention given to corrosion problems. The entire platform is classified as hazardous and wired in accordance with Article 500 of the National Electrical Code. The quarters platform, being remotely located, is wired in accordance with recognized marine practice.

This report has covered the electrical problems of offshore operations in only a generalized manner. Much additional thought and study must be devoted to the increasingly complex requirements of this burgeoning phase of the petroleum industry.

—The End



THE *pump* IS THE *heart* OF OIL PRODUCTION

Sargent BUILDS THE BEST PUMPS

SALES and SERVICE

CALIFORNIA Long Beach, Bakersfield, Santa Maria, Ventura, Taft, Huntington Park

OKLAHOMA Oklahoma City, Pawhuska, Seminole

TEXAS Odessa, Snyder, Fort Worth, Houston, Sundown, Wichita Falls, Quitman

NEW MEXICO Hobbs

KANSAS Chase, Russell

ILLINOIS Grayville

ARKANSAS Magnolia

COLORADO Rangely

Sargent pumps are the heart of the oilwell producing industry. Sargent builds every API designed pump with metals to fit any and all well conditions, plus a highly efficient rodless bottom hole hydraulic pump.

The responsibility of the oilfield operator is to economically produce oil. Sargent's thirty-six years of experience in building deepwell pumps, qualifies the statement that Sargent builds the pump to do the job.

Sargent provides the most complete service facilities in the industry by company trained experts in the heart of the oilfields through Sargent operated field stores.

Sargent pumps give you more for your money because they are the best pumps built anywhere.

"GOOD WILL" is the disposition of the pleased customer to return to the place where he has been well treated.

— U. S. Supreme Court

Standard of Excellence *Since 1920*

Sargent

ENGINEERING CORPORATION

MAIN OFFICE AND PLANT

2533 E. FIFTY SIXTH ST. • HUNTINGTON PARK, CALIF.

BUILDS PUMPS THAT BUILD GOOD WILL

A Gulf Coast Feature . . .

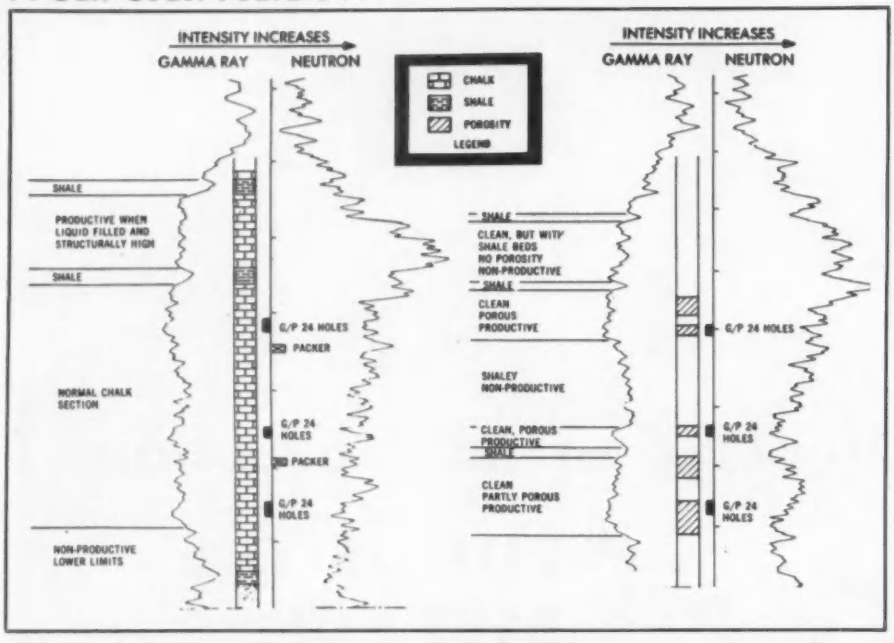


FIGURE 1—Qualitative description illustrates the basis for evaluation of zones to be perforated.

Louisiana's Pine Island . . . Chalk Rock Proving Ground

This field may prove to be a stepping stone for other chalk areas on the Gulf Coast.

By C. R. JORDAN
Lane-Wells Company, Shreveport, La.

PRIMARY AND SECONDARY oil recovery through modern methods have increased production and future reserves of the Annona chalk in the Pine Island field of north Louisiana. This proving ground may be the stepping stone for other chalk areas in the Gulf Coast. It may require several years to prove, but calculations indicate that the recoverable oil in the Annona, Saratoga and Austin chalk might be ultimately realized at better than 4 billion barrels.

The Pine Island field is some 20 miles north and west of Shreveport in Caddo Parish, Louisiana. At a relatively shallow depth, 1500-1700 feet, this section would be represented as the Upper Cretaceous system of the Gulf series. Traversing the sediments with depth, the Nacatoch Sand of the Navarro group produces locally in the Caddo field, the Saratoga chalk of the Taylor series produces at Zwolle, and the Annona chalk at Pine Island itself. Deeper, the Tokyo sand of the Austin group produces in the Caddo field, and the Tuscaloosa sand, locally called Woodbine, has possibilities as a very thin member. There are deeper horizons, many of which have been drilled and tested in the Lower Cretaceous, going to the Paluxy, the Rodessa, Pettit, and Hosston. The deepest test in the area drilled into igneous material at 11,419 feet.

Field Statistics. Wells have been commercially produced on 42,000 acres. According to the scouting records, some 7567 wells have been drilled, and had commercially produced about 200 million barrels of crude oil. The gravity of this oil, depending upon the zones producing, range from 20° to 42°. For example, the Nacatoch sand ranges from 20°-25°, the Annona chalk 30°-42°, and the Woodbine sand 30°-36°.

The Annona chalk itself is described as light gray to white, fossiliferous chalk, with scattered shale streaks. Good odors are apparent. Other descriptions include white and slightly fossiliferous chalk, with dark gray thin streaks of scattered shales. These thinly scattered shale streaks are impervious barriers to upper migration of oil, and the low permeabilities of the rock, not lending to prolific production, require other means than natural production for commercial probabilities. Fracturing has provided a boost to production at Pine Island.

It is estimated that barrels of oil in place range between 40,000 and high as 100,000 barrels per acre. These estimates, of course, vary, depending upon the thickness of the chalk and the location relative to the fault line.

It costs about $15,000 to drill and complete into tanks for the initial well, and $12,000 for each well thereafter. The present price of chalk rock oil is $2.80 per barrel, of which 80 cents is expended to lease and lifting costs.

There is no spacing, and some producers have a density pattern of one well per acre, concluding that the drainage per well is equivalent to 150 feet as a radius. Wells once produced 3 to 5 barrels of oil per day. With modern methods, the average well produces from 6 to 20 barrels of oil per day.

Past History. Few drillers' logs recorded the sands penetrated, but there was a "suit case" sand just above the Woodbine. The enterprising producer today uses this "suit case" sand for correlation of the Pine Island fault line. Drillers' records of this vintage cause an extremely difficult problem. They provide no information for thickness or oil shows, and as a consequence, there is a minimum of information available to the geologist and engineer.

Years ago, the use of hydrochloric acid in the Annona chalk increased

production, but the wells soon declined to their original three barrels of oil per day. The acid was being accepted by the most permeable rather than the most porous zones.

The hydrafrac treatment utilizing viscous fluids was the next step in improvement to acid treatment, and this practice was discontinued in favor of the sand-oil application.

Sand-Oil Treatment Practices. Oil produced locally from the Nacatoch, of low gravity and high viscosity, mixed with round grained sand, is pumped into the well at high velocities. Some operators use a refinery byproduct known as Fuel Oil No. 4 or Fuel Oil No. 5. Others use 40° chalk rock oil mixed with a gel material which raises the viscosity and lowers the gravity. Early in the development of this method, it was observed that wells with a casing seat above the chalk did not respond satisfactorily to the sand-oil treatment. A new program was begun where casing was set through, but above the bottom of the chalk. The open hole was sand-oil treated, and the top of the chalk was treated through perforations, using one packer. This was found to be unsatisfactory because the sand-oil was being pumped into the shale sections of the open hole, which, of course, were nonproductive. These were zones of weakness and did not lend themselves to vertical or horizontal possibilities of fracturing.

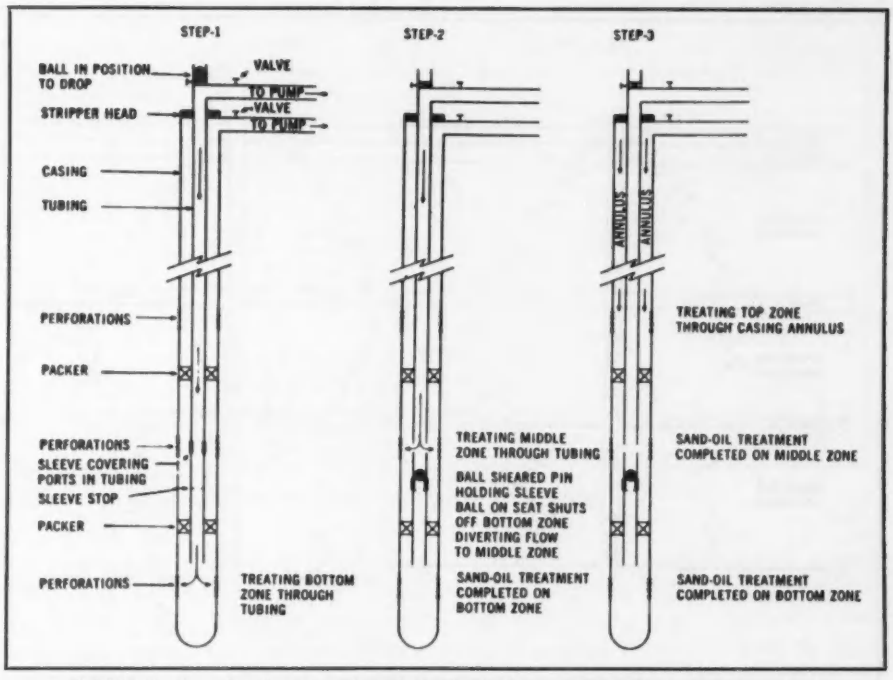


FIGURE 2—An effective procedure for selectively fracturing three separate zones.

Present Procedures with Radioactivity Logs. After the hole is drilled, casing set, and cement allowed to harden for at least 24 hours, a radioactivity log is run in order to determine which part of the lower chalk is most desirable for treatment. The shale-free sections of the chalk are selected from the gamma ray curve with the highest porosity values from the neutron curve, which are to be perforated and sand-oil treated.

Numerous qualitative descriptions are represented in Figure 1 in order

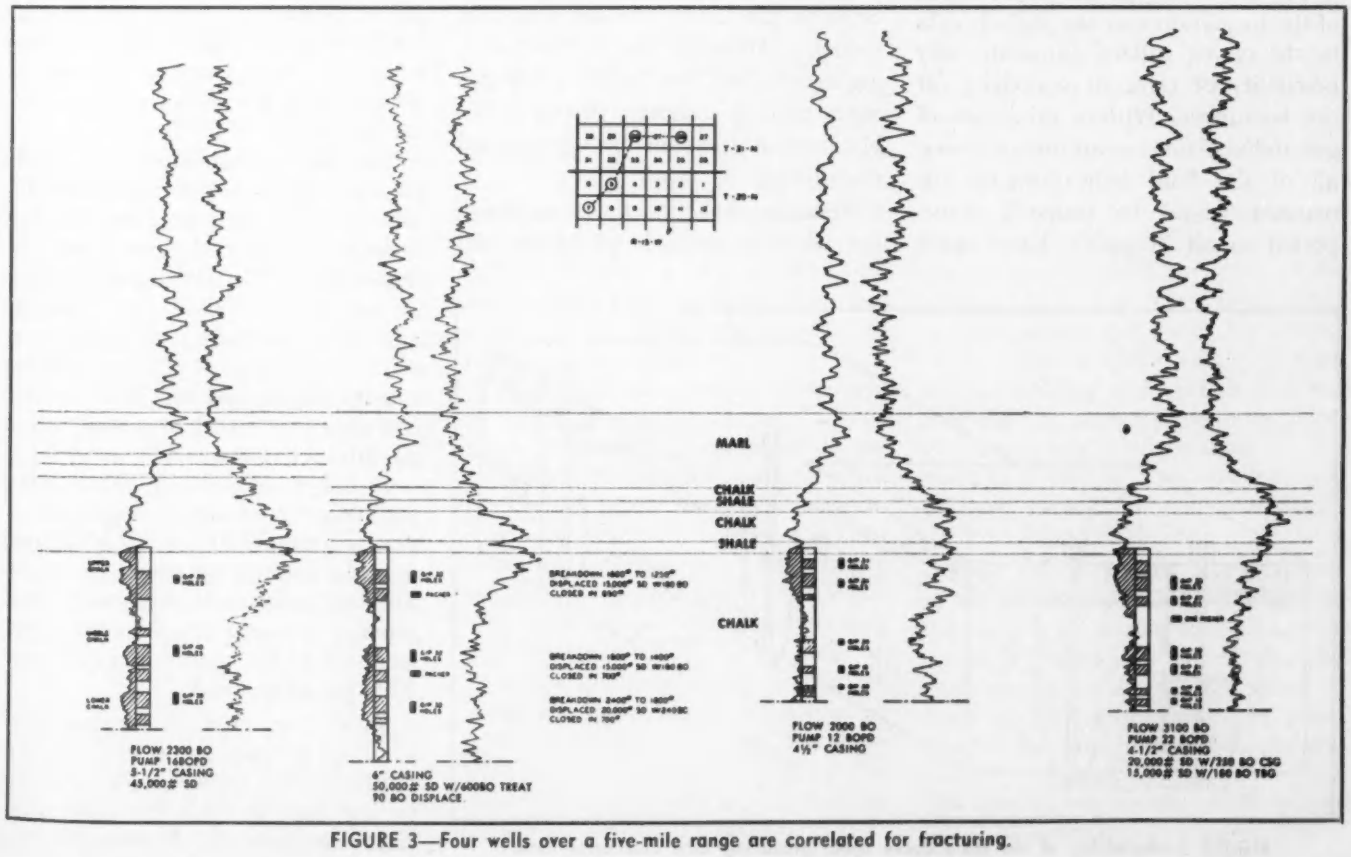


FIGURE 3—Four wells over a five-mile range are correlated for fracturing.

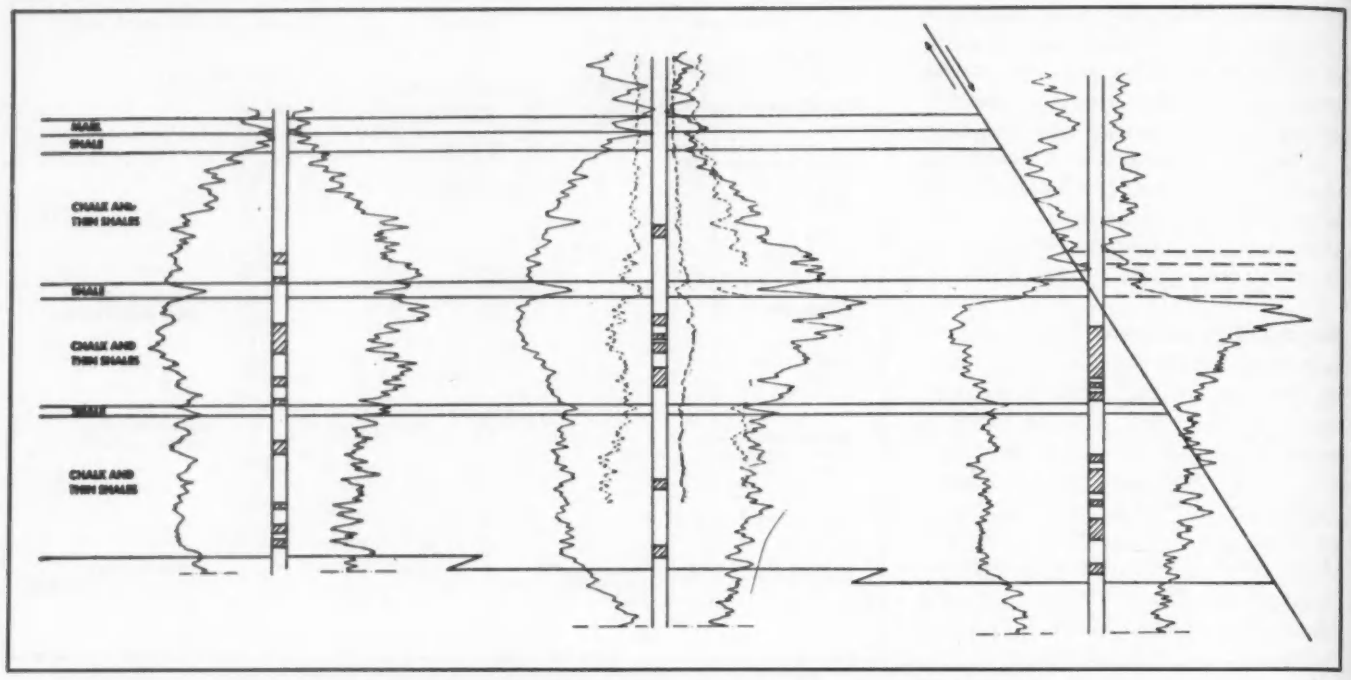


FIGURE 4—Easily recognized shales aid correlation of Pine Island wells near fault line.

to evaluate these selections of completion to comparable logs in the area that might not have performed as satisfactorily as expected. The sole purpose of the log, with reference to sand-oil treatment, is to place the perforations where they will effectively produce the highest quantity of oil.

The log, tying in the exact depth of the formation and the shale breaks to the casing collars, eliminates any possibility of error of selectivity for the treatment. With a minimum of gas and negligible quantities of water, all of the fluid indications on the neutron would be properly interpreted as oil in place. These zones are carefully tailored for length and perforating density. This allows a sufficient space available between the perforated sections for straddle packers. The number of feet perforated will vary with each well. A large zone of effective porosity might be 10 or 12 feet. Although this is normal, it has been found necessary, due to interpretation, to perforate smaller sections in the order of two four-foot sections. Although the radioactivity log may reflect four or five attractive zones of high porosity, two or possibly three are chosen for the original completion.

Straddle packers are now available for selective sand-oil treatment and the common practice is setting the casing through the entire chalk. Careful measurements are made to allow enough space above and below the prospective zones to isolate for perforating and sand-oil treatment. These later zones can be carefully eliminated due to the straddle packer arrangement. After perforating, the packers are run on the tubing to points six or eight feet below the perforated interval. This is to keep to a minimum sand from the treatment flowing back and accumulating above the packer.

The hole is circulated with chalk rock oil which has a gravity of 40°. The bottom zone is then "broken down" or pumped into, with the chalk rock oil in the tubing. This is immediately followed by a sand-oil admixture averaging two pounds of sand to each gallon of Nacatoch low gravity oil or fuel oil. This mixture can vary from one-half pound to four pounds per gallon. The amount of sand may vary from 10,000 to 50,000 pounds per zone. An average application will use 50,000 or 60,000 pounds in wells with large zones, or 15,000 to 20,000 pounds for wells with small zones. Displacement velocities vary from 400 to 600 gallons per minute at 2000-pound pressure.

When the sand-oil for one zone has been pumped into the chalk, it is displaced with enough oil to clear the tubing, and to flush the sand away from the borehole. By the use of a

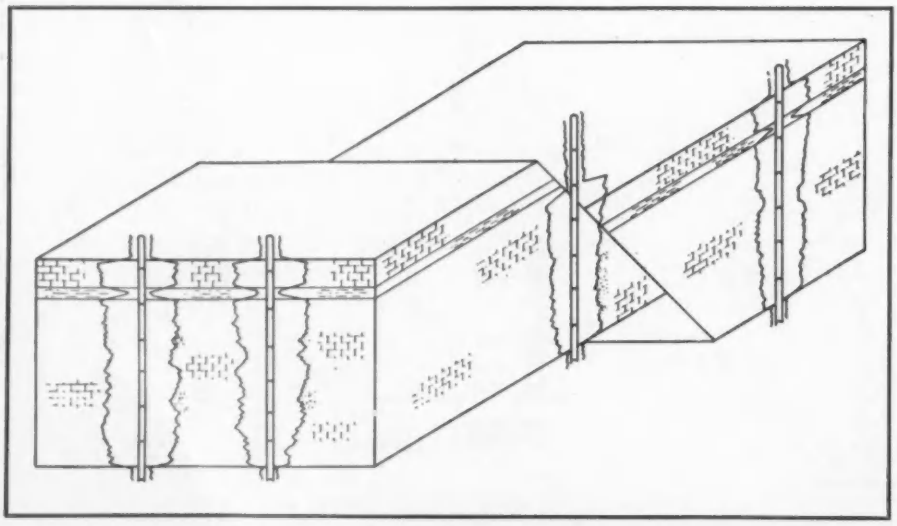


FIGURE 5—Reliability of the shale above upper producing zone aids correlation.

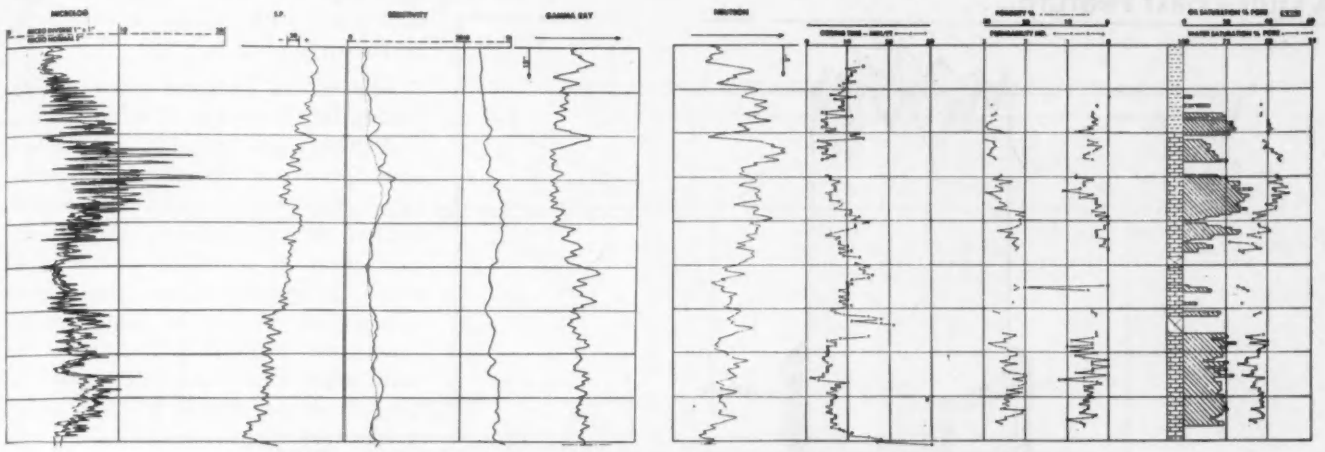


FIGURE 6—A comparison of logs shows radioactivity log best for Pine Island problems.

telescopic device and a bridging ball, the bottom zone is closed off and the middle zone is opened and treated. The top zone is then treated through the annulus in the same manner. The mechanics and equipment are diagrammed in Figure 2. The wells then are closed in for 24 hours. This is intended to prevent the back flow of sand into the well. Also, it allows the sand in the formation to "settle." Some operators immediately unseat the packers following completion of the treatment, leaving all zones open together, while others leave the packers seated to flow test separately. No appreciable difference in the amount of sand returned can be noted regardless of which of the two procedures is followed.

Usually the wells will flow back the frac oil, and a high percentage will continue to flow chalk oil for several days or even weeks, before they are put on the pump. Flowing oil may average 2500 barrels. An average well will produce 10 to 20 barrels daily on the pump.

Correlation of four wells through a five mile range is represented in Figure 3. There is a decided general similarity, yet a difference in the definity of character on both the gamma ray and the neutron curves for the upper middle and lower chalk. As selective completion is so critical, the release of information was obtained on the various wells shown to indicate the total zones of porosity, the net zones gun perforated, the sand-oil treatments which include the breakdown pressures, sand displacement, and the shut-in pressures at the time of completion. The casing program may differ, depending upon the operators' selection of grade and range, but in every case the perforating is selective. It must be recognized that these zones are for the present completion, and are spaced to permit a secondary treatment at some future date, using similar methods.

Core Analysis. Three wells in the same section, township, and range are correlated in Figure 4 to show the three sections of chalk and the easily recognized correlatable shales. The wells are close to the fault line of the Pine Island field. An effort was made to represent the faulting by the selection of these three wells to show the stratigraphic range through the upper and middle chalk. An electrical log and a radioactivity log of the same hole are compared in Well 2. The cross-hatching in the center of each well indicates the total, rather than the net zones of porosity, to show that the oil bearing zones are not especially correlatable from well to well. Producers in the field claim that the short radius of drainage per well does not affect the production rates of nearby offsets.

Working with operators in an area of little information causes one to think in terms of probabilities. In the realization that the selectivity of completion is so acute for a maximum recovery of barrels of oil per acre, hypothetical radioactivity logs facing the sides of the blocks, with the inside wells depicted as cutting the fault at the interface, are represented in Figure 5. The purpose of the diagram is not the indication of oil according to the neutron curve, but the reliability of the shale at the top of the upper producing zone and its relation to productivity in the chalk.

Where some producers drill a hole, cement casing, run a radioactivity log, perforate, and sand-oil treat, other producers find it best to have a more complete record. This includes the electrical log, microlog, radioactivity log, drilling time, and core analysis. A comparison of all the data with the radioactivity log is shown in Figure 6. Due to the extremely thin shale streaks in the chalk, it is very difficult for the electrical log to differentiate between the clean portions of the chalk and the shale streaks; therefore, little character is observed in the potential curve. Proper calculations and interpretation of the resistivity curves are rather difficult, due to the high resistivity values of the oil zones and the dry dense streaks. The microlog is an aid in this direction, but does not indicate the proportionate values of porosity.

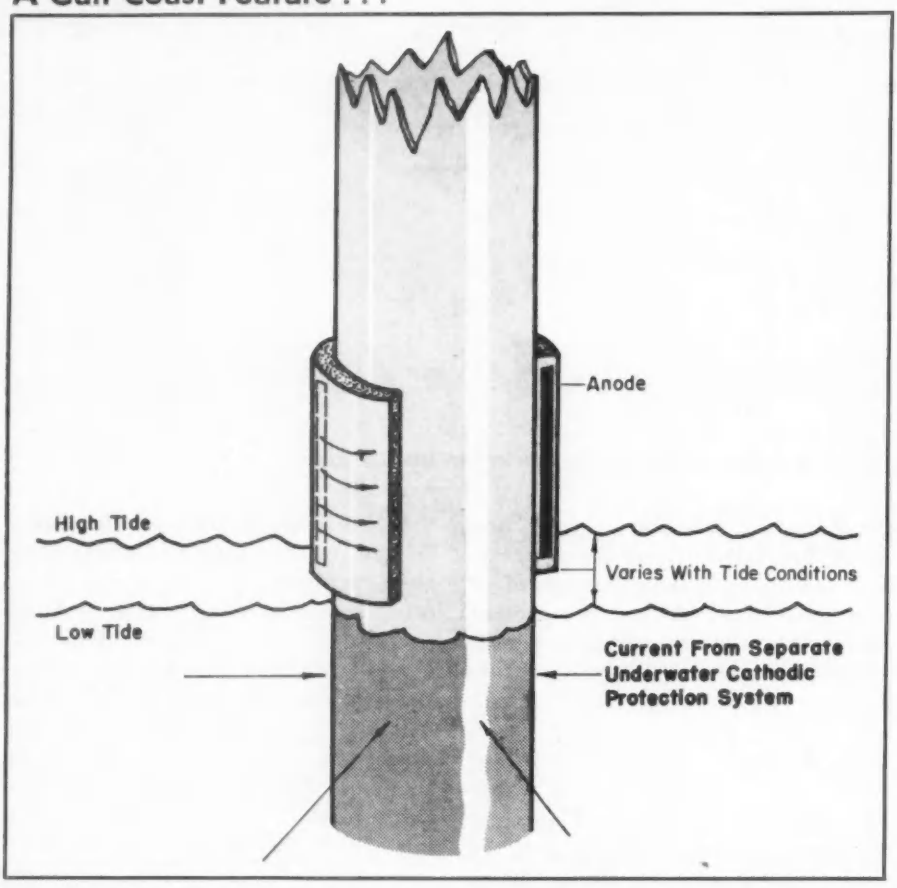
The radioactivity log, not affected by the fluid in the hole, represents the stratigraphy of chalk and shale on the gamma ray, and the liquid-filled porosity versus the dense dry streaks on the neutron. This is further proved by the drilling time graph and the core analysis, showing the oil in place. Certainly most information is derived from the radioactivity log, as a primary survey, for the problem in the Pine Island field.

With relatively low cost per well in this proved area, calculated against the barrels of recoverable oil in the future, it is natural to believe that the chalk in this area will be subject to many direct improvements in practices in the present and near future.

ACKNOWLEDGMENT

The writer expresses his appreciation to the many producers releasing the logs and data, and the helpful aids making this article possible.

A Gulf Coast Feature . . .



Schematic illustration of splash zone cathodic protection system. A separate galvanic anode system supplies current for the splash and tidal zone area while a conventional system protects the continuously submerged area.

Cathodic Protection Reaches Up to Cover the Splash Zone

A new development in cathodic protection for combatting corrosion in the splash zone arouses interest.

By MAURICE A. RIORDAN
Rio Engineering Company
Houston

RECENT DEVELOPMENTS indicate that the application of cathodic protection to control corrosion in the splash and tidal zones has practical possibilities. The following concerns the various aspects of a cathodic protection method of this type that is now undergoing field tests. Although firm conclusions would be premature at this time, it is believed that the approach will be of interest to those concerned with splash or tidal zone corrosion problems.

The use of cathodic protection in preventing corrosion of underground and underwater metallic structures is well known. In marine environments, experience has adequately demonstrated the effectiveness of cathodic protection in arresting corrosion of steel surfaces that are continuously submerged. By comparison, the exposed steel surfaces in the splash and tidal zone usually undergo more severe corrosion attack. In these zones, a moisture film is sustained by tide, wave and splash activity and the atmosphere provides an unlimited supply of oxygen. These conditions constitute a severely corrosive environment and accelerated corrosion results.

Figures 1 and 2 are schematic illustrations that typify conventional schemes of providing cathodic protection to underwater surfaces. In a simplified sense, cathodic protection is achieved only where direct current of proper polarity and proper density enters the metallic surface from the electrolyte or water. Therefore, an environment which supports the transfer of adequate current to the metallic surface is essential to this type of cathodic protection. In the splash zone, such an environment does not normally exist.

Consequently, conventional corrosion control above the water line has been confined to systems involving surface coating applications of various materials and techniques. Special preparation of the surface prior to the application of these coatings is often necessary. In comparison with other areas, earlier coating failure usually can be expected in the splash and tidal zone. Where such coatings are susceptible to damage or deterioration, the resulting surface conditions may preclude the practical possibility of repair or replacement on the site. (It is conceivable that the surface conditions would not be an obstacle to a cathodic protection scheme.)

In providing cathodic protection above the water line, the first step involves the artificial creation of an environment that will support proper current flow. This can be accomplished by surrounding the surfaces involved with a material of suitable electrical conductivity. A substance that inherently possesses this characteristic

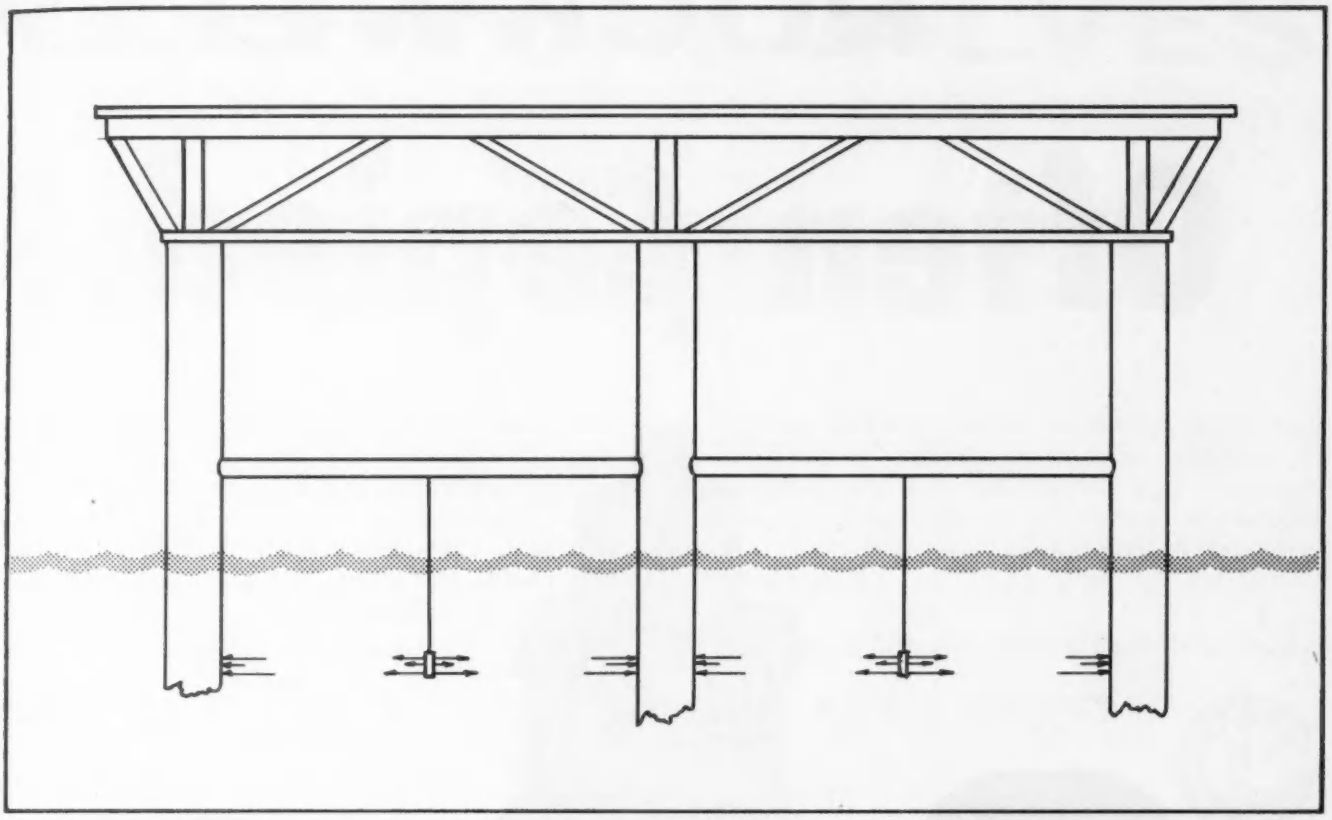


FIGURE 1—Underwater cathodic protection system using galvanic anodes. Protective current is supplied to the submerged surfaces only as indicated by the arrows.

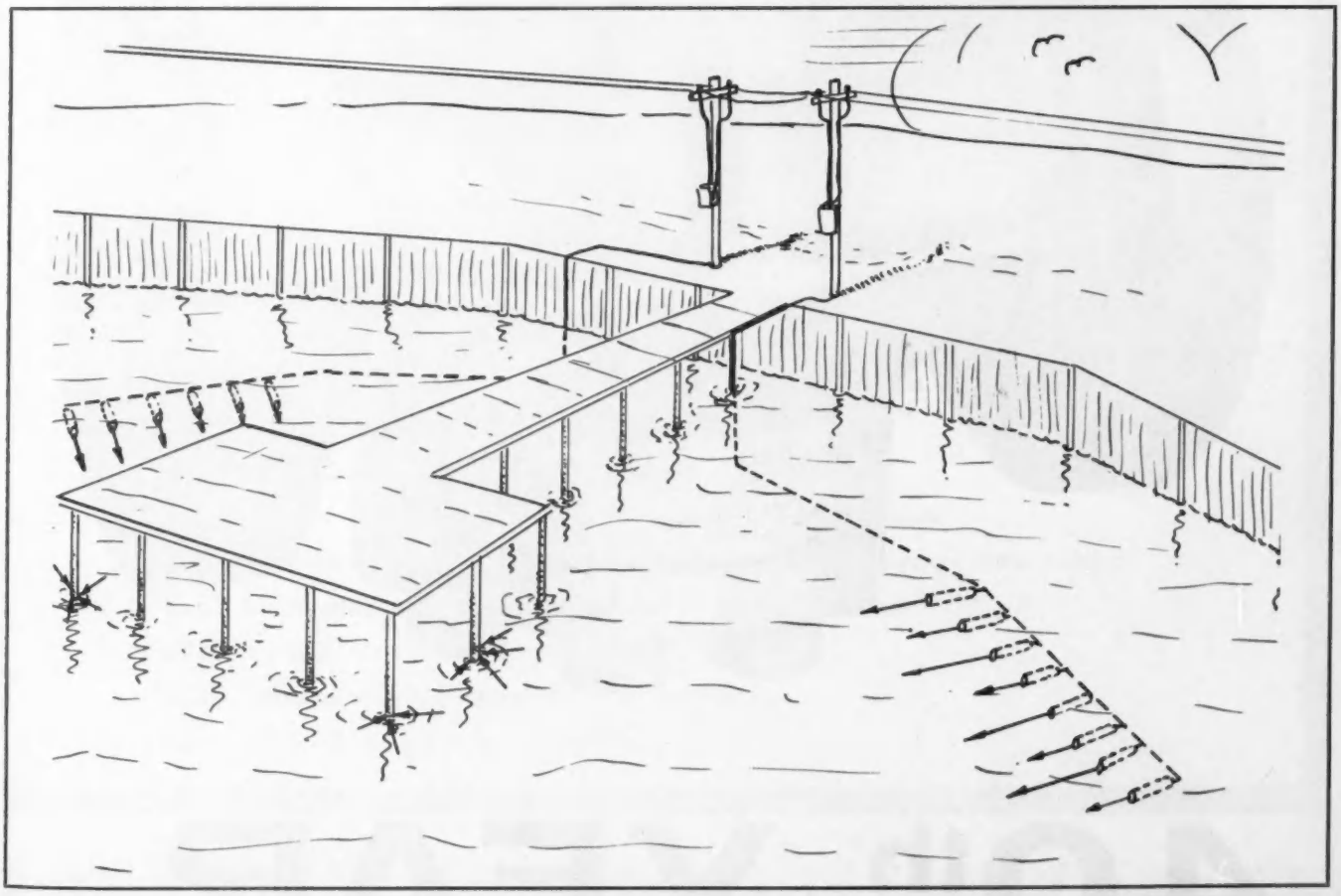


FIGURE 2—Underwater cathodic protection system using impressed direct current. Protective current is supplied to the submerged surfaces only as indicated by the arrows.

ROCKWELL-

Often Copied...

40th YEAR *of*

Nordstrom VALVES

Never Equaled

Rockwell-Nordstrom is the *original* lubricated plug valve. But that is only part of the story behind forty years of lubricated plug valve leadership. Starting with the first valve, *every major development* in lubricated plug valves has come to you *first* in a Rockwell-Nordstrom valve. Today, as always, the *oldest* lubricated plug valve is also the *newest* in terms of better performance, longer life and lower cost.

Below are listed only a few of the more than ninety basic Rockwell-Nordstrom valve and lubricant innovations. They are the reasons why Rockwell-Nordstrom valves—although often copied—have *never* been equaled. Rockwell Manufacturing Company, Pittsburgh 8, Pa.

Canadian Valve Licensee: Peacock Brothers Limited

ROCKWELL-Nordstrom VALVES

Lubricant Sealed for Positive Shut-off

first...for forty years *Here are just a few of more than ninety basic valve and lubricant innovations that have maintained the leadership of Rockwell-Nordstrom valves—through better performance, longer life and lower cost.*

- **FIRST Lubricated Plug Valve**
- **FIRST Sealdport* pressurized lubricant sealing**
- **FIRST Hydraulic plug jacking for fast, dependable operation**
- **FIRST Hypreseal* for high pressure plug valve service (still exclusive)**
- **FIRST Special plug and body coatings—longer life on "tough" services**
- **FIRST Automatic shut-off valves for gas pipelines**
- **FIRST "Self-Energizing" valve lubricants**
- **FIRST Line of special and general purpose valve lubricants**
- **FIRST Multiport lubricated plug valves for 3-way and 4-way flow control**
- **FIRST Lubricated plug valve for low temperature service**
- **FIRST Venturi valve for lower cost on larger lines**
- **FIRST Lubricated plug Christmas tree valves**

*Registered trade mark Rockwell Manufacturing Company

lubricated plug valve leadership

FIGURE 3—A rudimentary form of the cathodic protection jacket now undergoing tests on a Gulf Coast installation. If successful it should wrap up splash zone corrosion problems.

or which achieves it by the supplementary action of moisture absorption and retention would meet the fundamental requirements. This material enclosed in a jacket of suitable mechanical strength, should cover the splash zone area and extend into or below the tidal zone depending on the corrosive and water level conditions involved. Effectively, a new and fixed water line would then be established in an area where such corrosion could be readily controlled.

Current distribution throughout this coated area is a function of the potential, resistance and attenuation characteristics involved. In relating these characteristics to coating thicknesses of practical proportions, it is concluded that the current available from the underwater protective system has no significant value for splash zone protection in most cases.

Therefore, a separate source of direct current is required. Galvanic anodes included in the jacket are adaptable to such a situation. The physical limitations imposed by practical jacket dimensions restrict the available anode to structure configurations. Practical anode shapes result in grossly inefficient current distribution patterns due to resulting proximity of anode to structure. The addition of resistance in the external circuit reduces the magnitude of the current distribution pattern but does not appreciably alter this inefficient current distribution ratio.

To overcome this obstacle, an insulating shield of proper resistance characteristics can be inserted between the anode and the structure. This shield would make it possible to achieve the current distribution and anode life required of a practical installation.

Essentially, the preceding discussion covers the fundamental principles involved in the scheme[1] presently under development.

Obviously the jacket and enclosed material must adequately perform other essential functions. For example, electrical contact with all points of the surface must be established and maintained. (Relatively extensive surface areas may be involved.) Adequate strength is required to withstand the mechanical abuse typical of the exposure. The materials used must survive in a marine environment. They must withstand the action of the electrochemical processes involved without loss of effectiveness. On old structures, the material must conform to the irregularities of surface contour resulting from previous exposure. Effectiveness to a vertical height of ten feet above mean high tide is regarded as a reasonable objective.

Of the various materials investigated, mats or wrappings which involve discontinuities, partial surface contact or extensive surface preparation fulfill the requirements. The most promising material consists of a mixture of molding plaster, gypsum, and fresh water. The setting, pouring, moisture absorption and moisture retention can be controlled within reasonable limits by varying the mixture proportion and addition of other ingredients. The viscosity of the mixture prior to setting permits conformation to surface irregularities and the presence of free water does not interfere with setting qualities. Because the mixture displaces water, a water tight jacket is not required. The slight solubility of the mixture is not considered objectionable, when adequately shielded by the jacket. Jacket protection and setting qualities minimize the possibility of leaching.

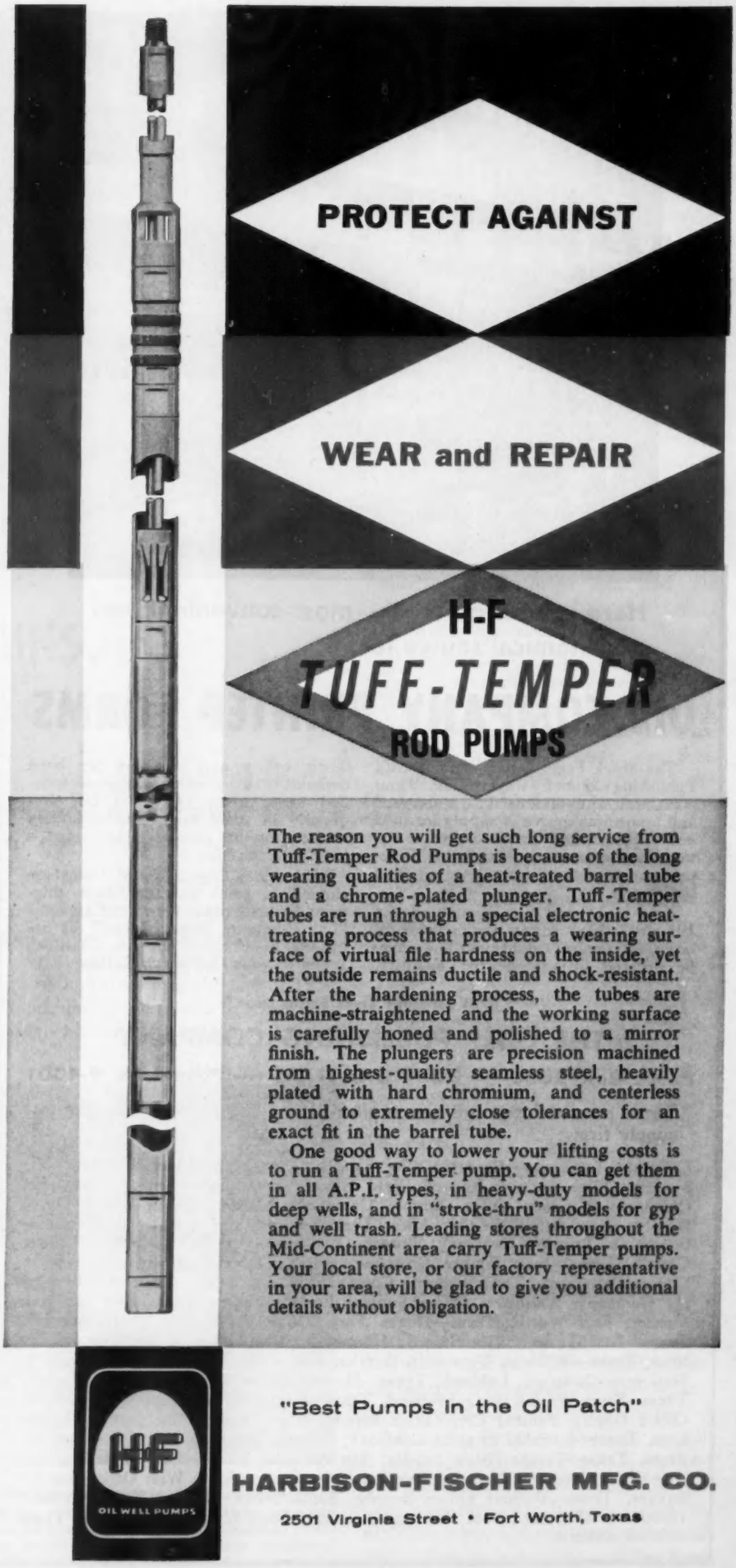
Reinforced plastic materials having excellent resistance to marine environment are available for such jacket construction. Liberal tolerances in jacket construction are permissible since water tightness is not required. Only a reasonable enclosure is necessary. Fibrous material will readily provide an adequate seal during the pouring operation. In addition, the jacket provides mechanical protection,

FIGURE 4—Severe corrosion had been experienced and tidal zone of test H-beam fender pile.

shielding action, preserves original contours, confines current to the enclosed area and serves as a form for the pouring operation.

Laboratory results have justified a field test program. One such field test is pictured in Figures 3, 4 and 5. Here severe corrosion has been experienced in the splash and tidal zone of an H beam fender pile. The H beam supports a bumper rail. Shock involved in docking ocean-going tankers results in flexure of the H beam. The initial protective coating has deteriorated and surface conditions tend to discourage re-application of coatings. A rudimentary form of the device described above has been applied to six of these H beams for field tests. The jacket shape and construction, as illustrated, is not to be construed as being typical of a permanent installation. But in this instance it serves adequately in achieving the immediate test objectives. Also, the shape of the H-beam is of no particular significance. It is considered that this scheme would also be applicable to structures of other shapes, cylindrical or otherwise. Although the splash and tidal zone (as pictured) is of limited extent, this Gulf Coast exposure represents a rugged test site from the standpoint of salinity, marine organisms, and corrosivity. It is anticipated that performance results from this installation will provide valuable information concerning the feasibility of this scheme.

The ultimate objective is the ap-


PROTECT AGAINST
WEAR and REPAIR
H-F
TUFF-TEMPER
ROD PUMPS
The reason you will get such long service from Tuff-Temper Rod Pumps is because of the long wearing qualities of a heat-treated barrel tube and a chrome-plated plunger. Tuff-Temper tubes are run through a special electronic heat-treating process that produces a wearing surface of virtual file hardness on the inside, yet the outside remains ductile and shock-resistant. After the hardening process, the tubes are machine-straightened and the working surface is carefully honed and polished to a mirror finish. The plungers are precision machined from highest-quality seamless steel, heavily plated with hard chromium, and centerless ground to extremely close tolerances for an exact fit in the barrel tube.
One good way to lower your lifting costs is to run a Tuff-Temper pump. You can get them in all A.P.I. types, in heavy-duty models for deep wells, and in "stroke-thru" models for gyp and well trash. Leading stores throughout the Mid-Continent area carry Tuff-Temper pumps. Your local store, or our factory representative in your area, will be glad to give you additional details without obligation.
HF
OIL WELL PUMPS
"Best Pumps in the Oil Patch"
HARBISON-FISCHER MFG. CO.
2501 Virginia Street • Fort Worth, Texas

Here is your quickest--most convenient and economical source for

OIL COMPANY PRINTED FORMS

The Stock Form department of Gulf Publishing Company was established and is maintained to fill a need for a constant and immediate source of supply for field and office printed forms adapted to the use of oil companies, contractors, independent operators and related lines of business.

Now in general use throughout the industry, these forms are printed in large, economical quantities. They may be ordered in any desired quantity. Their utility and economy has been demonstrated by several thousand satisfied users, many of whom buy frequently in small quantities as needed because orders generally are shipped the day received.

More than fifty different forms are carried in stock for immediate shipment.* Write today for a free Catalog of "Oil Company Stock Forms" or see "FORMS—Printed" in the Classified Index of your Composite Catalog.

Oil Company Stock Forms Dept.

THE GULF PUBLISHING COMPANY

P. O. Box 2608 — HOUSTON, TEXAS — Phone JA 9-4301

*** These printed forms are also available from the following local office supply firms:**

Lafayette, Louisiana—General Office Supply Company; **Artesia, New Mexico**—Sanders Office Supply; **Roswell, New Mexico**—John Office Supply; **Guymon, Oklahoma**—Guymon Office Supply Company; **Abilene, Texas**—Crain Office Supply, Shaw Office Supply; **Alice, Texas**—The Atkins Company, Echo Stationery & Printing Company; **Borger, Texas**—Borger Office Supply; **Corpus Christi, Texas**—Jack Bonner Company, Cole's Office Equipment, Maverick-Clarke, Patterson's, Texas Printing Company; **Dallas, Texas**—Dallas Office Supply Company, Southwest Office Supply; **Fort Stockton, Texas**—Fort Stockton Pioneer; **Fort Worth, Texas**—Hogan Fort Worth Office Supply; **Jacksonville, Texas**—East Texas Office Supply; **Kermit, Texas**—Kermit Office Supply; **Lamesa, Texas**—Williams Typewriter Service; **Longview, Texas**—Topp Printing & Stationery Company; **Lubbock, Texas**—Hester's Office Supply Company; **Lufkin, Texas**—Story-Wright, Inc.; **Midland, Texas**—Garner Office Supply, Ray Gwyn Office Supply, Panther City Office Supply, West Texas Office Supply; **Monahans, Texas**—Sprinkle Printing Company; **Odessa, Texas**—Nelson Office Supply; **Pecos, Texas**—Hubbs Office Supply; **San Antonio, Texas**—Paul Anderson Co., The Clegg Company, National Printing & Stationery, South West Office Supply; **Snyder, Texas**—Bennett Office Supply, Bud's Office Supply; **Tyler, Texas**—Hixson & Ellis, Inc., Pool Printing Company, Story-Wright, Inc.; **Wink, Texas**—Wink Bulletin.

FIGURE 5—The H-beam supports a bumper rail. Shock involved in docking tankers results in flexure of the H-beam.

plication of cathodic protection to the splash zone and tidal zone of marine structures in the presence of an underwater cathodic protection system. This conceivably includes harbor, bay and river facilities, and offshore installations such as wellheads and platforms, etc.

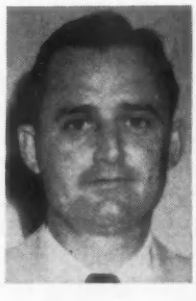
If successful in this endeavor, the scope of cathodic protection will have been extended. Another tool will be available to combat corrosion in critical areas which have previously defied the effective use of cathodic protection.

—The End

REFERENCE

[1] Patent pending.

About the Author



MAURICE A. RIORDAN, a partner in the Rio Engineering firm, holds a degree in metallurgical engineering from Rensselaer Polytechnic Institute. After service in the U. S. Navy, he was engaged in electrochemical research and development work in cathodic protection. He is a registered professional engineer. He specializes in the design and installation of cathodic protection systems.

Photos courtesy Empresa Colombiana de Petroleos

A section of the Carare's dense forest being cleared for a drilling site. Operations are hampered by the region's rainfall which ranges up to 1200 inches in a year.

Cities Service Will Seek Oil in Colombia's Carare

Unusual agreement with government-owned Empresa opens region under domestic litigation for 15 years.

CITIES SERVICE Petroleum Corporation will begin exploration operations in the southern part of the de Mares concession of Colombia, known as the Carare, which has been under litigation for 15 years between the government and Compania Explotadora del Carare S.A.

After a recent Supreme Court ruling in its favor, the government gained control of the Carare region.

Cities Service will begin operating under an oil development agreement with the government-owned Empresa Colombiana de Petroleos. The pact covers an area extending southeast from the Magdalena river to the boundary of the de Mares concession. North of the northern limit of the area, formed by the Opon river, are the Infantas and La Cira structures which have been producing oil for about 30 years.

The region is one of excessive rainfall, which ranges up to 1200 inches a year, and an 80-degree mean temperature. It is sparsely settled, almost without roads, and with heavy tropical jungles. It is reputed to be rich in undeveloped but useful woods.

With estimated crude reserves of 525 million barrels at the end of 1954, Colombian crude production has been rising. The yield for 1954 of 108,550 barrels a day was about 1 percent greater than daily average production for 1953. Shell Oil Company was the leading producer with a total of 16,356,401 barrels for 1954, and Empresa followed with 11,599,417 barrels. Bulk of the production is heavy crude. Only Colombian Petroleum Company's Barco concession on the eastern border and Shell's small Dificil field in the coastal area produce high grade crude.

Is the Carare as rich in oil as rumors say? The rig for which this location is being prepared may be a partial answer. When possible, clearing operations such as this are conducted beneath palm leaf shelters.

Since its incorporation, to take over the de Mares concession from Tropical Oil Company after expiration of the original agreement (WORLD OIL, July 1, 1952, p. 251 and July 15, 1952, p. 148), Empresa has had authority to enter into any advisable arrangement with other oil companies for technical assistance, delegated administration or on a partnership basis.

For example, International Petroleum operates the Barrancabermeja refinery for Empresa and had, for more than a year, a separate technical assistance agreement.

However, Cities Service and Empresa emphasized the unusual character of their arrangement—full cooperation between a government-owned company and a private operator. Cities Service, operating through the Colombian branch of its subsidiary, Colombia Cities Service Petroleum Corporation, shares 75-25 percent with Empresa in investments, expenses and income. But it must pay Empresa a royalty, before profits, of between 17 percent and 20 percent.

The joint investment of the initial five years can fluctuate between $7.5 million and $10.5 million. The agreement is for 50 years, but Cities Service has to stake out during the first 12 years the areas which it proposes to work and develop during the next 28 years.

From the 40th year forward, Cities Service will be limited to only normal operations without further exploration. At the expiration of the pact, all installations and equipment will be turned over to Empresa without cost.

Negotiations with Cities Service had begun in May, 1955, after Empresa had been studying the situation. The discussions culminated in the agreement signed Dec. 14, 1955.

Similarly, Empresa recently signed a contract with the Forest Corporation for secondary recovery of the La Cira structure, which is expected to increase reserves there to an estimated 130 million barrels. **—The End**

A World Oil Interview With

Victor Andrade

Bolivian Ambassador to the United States

Bolivia Wants Help, Ambassador Says

His Excellency, Victor Andrade, ambassador of Bolivia to the U. S., in an exclusive interview for WORLD OIL, replied to pertinent questions most frequently asked by major oil companies and independent operators interested in "going abroad" and, more specifically, in entering Bolivia to develop that country's oil and gas resources. Ambassador Andrade, who is a great admirer of the U. S., states frankly that his country wants private capital and needs money and know-how to develop its oil resources.

VICTOR ANDRADE, Bolivian Abassador to the United States as well as to the Organization of American States, has had a distinguished political career in the service of his country. Born in Chulumani, La Paz, Bolivia, he majored in political science at the University of La Paz and graduated with a degree in law in 1930. Shortly afterwards he entered government service as Under-Secretary of Education and since then has served his country in many high-ranking posts including that of Minister of Foreign Affairs, Minister of Labor and as chief of a number of important inter-American conferences. He was appointed ambassador to the United States in 1952. His literary works include "Essay on Social Conditions in Bolivia."

By ANTHONY GIBBON
WORLD OIL Staff

Q *What are the outstanding points of the new Bolivian oil law?*

A The Bolivian Petroleum Code, which was promulgated by the president on October 26, 1955, is specifically designed to attract investment in our oil resources. All indications are that Bolivia's oil resources are tremendous and will require funds and technical resources which are beyond our capacity at present. We are anxious, therefore, to share the development of our wealth with outside capital in a manner which will be beneficial to all concerned.

The new code offers concessions for a period up to 50 years to private persons or organizations interested in the exploration and development of oil properties or in the refining, manufacturing, transportation, and exportation of oil products.

The concessions confer exclusive rights of exploration and subsequent exploitation and may be acquired by anyone providing evidence of technical and financial capacity to handle them properly.

They include:

- A depletion allowance of 27 percent per year of the gross value of petroleum and natural gas production.
- Amortization of capital at the rate of 20 percent annually.
- Areas for exploration and subsequent exploitation, or for direct exploitation, of up to 3 million hectares (approximately 7,410,000 acres), depending on geographic location.
- Concessions for the purpose of exploration will be made for periods up to ten years; concessions for direct exploitation, for 40 years.
- Exemption of all necessary machinery, equipment, tools and materials from import duties and fees.
- Exemption of exports of petroleum, derivatives and petroleum products from export taxes and controls.
- Freedom to convert receipts from capital investments

or the sale and exportation of petroleum products into dollars, or the currency in which the investment was made.

• Liberal tax deductions and a fixed annual income tax not in excess of 30 percent of net profits.

Under the new code Bolivia is divided into three geographic zones. Concessions available for immediate exploitation range from a minimum of 1000 hectares (approximately 2470 acres) to a maximum of 375,000 hectares (approximately 926,000 acres). Areas for exploration and subsequent exploitation range from a minimum of 5000 (approximately 12,350 acres) to a maximum of 750,000 (approximately 1,853,000 acres) hectares. Concessions up to 3 million hectares (approximately 7,410,000 acres) may be granted for combined exploration and direct exploitation operations.

The Code also provides for the formation of joint companies in the area now reserved for YPFB, the government oil corporation.

Depending on the zone selected, the minimum annual investment per hectare (1 hectare equals approximately 2.47 acres) required under the code varies from 20 to 80 cents. Other important financial obligations of the concessionaire include:

• Payment of an annual surface exploration tax of two to five cents per hectare, depending on the zone selected.

• Payment of a royalty, subject to reduction, equal to 11 percent of the crude oil and other products obtained from the concession.

• Payment of an initial exploitation tax of 20 to 40 cents per hectare, depending on the zone selected, plus an annual exploitation surface tax from which the amount of the royalty may be deducted.

The minimum drilling obligations are as follows:

• One or more wells, at least 5000 meters (16,400 feet) in depth, for each 100,000 hectares granted during the first seven years.

• Two or more wells, with a minimum total depth of 10,000 meters, for each 20,000 hectares granted during the next eight years.

The code also specifies that 70 percent of management and 15 percent of workers may be foreign personnel.

Applications for oil concessions began being received Feb. 25. Detailed regulations governing the implementation of code were issued Jan. 24, 1956.

Q *Since the new Bolivian oil law was promulgated as a decree can it be abrogated by the President of the Republic at will? Is there a possibility that the Bolivian Congress will enact or confirm the new oil decree and make it an organic piece of legislation?*

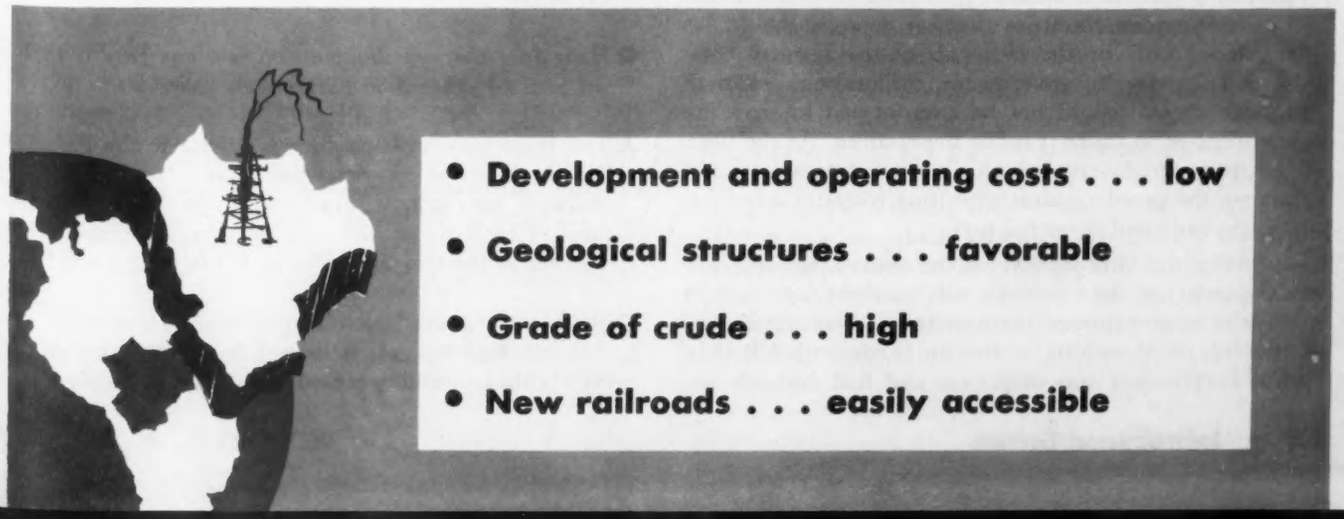
A It is true that a decree can be abrogated or modified by another decree. However, the juridical tradition of Bolivia, as well as all of the Latin American countries, is that no modification has a retroactive effect. Therefore the rights, concessions, or obligations deriving from the outstanding decree continue even in the event that such decree is abrogated.

Nevertheless, in the case of the Petroleum Code, this is a very important matter to the country and such a step has been taken only after very serious consideration by the government and the party in power. Hence, it can be assured that the abrogation of such a law cannot come as easily and lightly as it may appear by the fact that it is a decree.

In any event, it is the firm intention of the government, and it has to be in order to normalize the juridical situation in regards to oil development, that this code will be presented to the Congress. Everything up to now indicates that that Congress will have a substantial majority from the MNR Party and therefore the approval of the law will not find any substantial opposition.

Q *We know that in years past the Bolivian government*

Bolivia's oil resources, says one expert, currently offer one of the most attractive prospects in South America, and here is why . . .


• Development and operating costs . . . low
• Geological structures . . . favorable
• Grade of crude . . . high
• New railroads . . . easily accessible

expropriated private capital oil properties. What guarantee is there, or will be given, that similar action may not be repeated?

A The action taken in years past in regards to the cancellation of certain concessions and expropriation of some of the facilities of them was widely discussed at that time. This event was publicly closed by mutual agreement in 1940 through the payment of a certain amount of money by the Bolivian government and the acceptance of that money by the foreign concessionaires. Nevertheless, I will repeat here what I said in my address to the Petroleum Executive Council of the Chamber of Commerce of Tulsa, February 16:

"Quite a few concessions were awarded; eventually, most of these were acquired by the Standard Oil Company of New Jersey, which drilled some wells and found oil. Unfortunately, my country had no experience with petroleum and knew little about petroleum techniques. Many Bolivians did not take into account the problems involved in the transportation and marketing of oil. They felt the discovery of oil should be followed almost immediately by the sale of the product in the market. The impression grew that Standard Oil planned to hold to Bolivian oil in reserve and would not sell it until other fields had been exploited to the fullest.

"The war between Bolivia and Paraguay further complicated an already complicated situation. The report spread that one objective of the Paraguayans was the Bolivian oil fields. The Bolivians, or some of them, expected aid out of Standard Oil to help the country in its military struggle which was not received. Finally, the government dispossessed Standard Oil, giving as one reason violation of the terms of the contract because the company exported some oil to Argentina.

As I stated, I am not arguing the merits of this unfortunate occurrence. I want you to keep in mind that at that time the tin barons controlled the government and they cancelled the oil leases.

"Nor should you forget the policy of the tin barons which subordinated the development of all the country's resources—with the exception, of course, of tin. After the cancellation of the concessions, their politicians began a propaganda campaign inside the country to justify what had happened. This propaganda was part of a general sentiment prevailing in most of the Latin American countries that oil deposits should be developed only by the nationals of the country concerned, chiefly by government corporations, so that foreign capital could not be transformed into an instrument of so-called Yankee imperialism. At the time this propaganda created an almost fanatical attitude among the people against admitting foreign capital for the development of oil resources.

"After the cancellation of the concessions, the development of the country's oil resources was turned over to a government corporation. It was significant, however, that so long as the tin barons ruled Bolivia this corporation was neglected and had little in the way of funds or equipment. Once again, the tin barons looked after their own immediate affairs and neglected the rest of the country.

"With the return of the MNR to power in 1952, drilling for oil resumed again. Despite almost phenomenal success, the government and the leaders of the country came to the conclusion that outside capital and know-how was needed. This was a deliberate decision in the face of the sentiment aroused by propaganda against foreign oil interests by the agents of the tin barons. Only a political party with a deep concern for the national interest and overwhelmingly supported by the people of the country could take such a step. It took courage to make this decision and courage to take the steps necessary to carry it out."

In addition to the experience acquired and the fact that the new Petroleum Code is a deliberate action that tends to satisfy the mutual interests of the Bolivian peoples and the private investors, it also can be mentioned that Bolivia subscribed to the Investment Guaranty Program of the Mutual Security Act in September 1955.

This is a program initiated by the U. S. government under which American citizens who wish to invest in foreign countries can be insured against inability to convert foreign currency receipts into dollars, and loss through expropriation and confiscation. Yet, in all human relations there has to be a certain amount of mutual faith involved. Excessive distrust can be as damaging as the other extreme, that is, naive confidence.

Q *Does the Bolivian, or national, oil company plan to develop its properties, or is there a possibility that it will negotiate with private capital oil companies for the development of some of its properties? This question is asked because it is the understanding of those who have studied the oil situation in Bolivia that much of the more attractive acreage in Bolivia has been assigned to the national company.*

A The Bolivian government corporation that operates some of the oil fields in Bolivia has full powers in autonomy to enter into all kinds of agreements with private capital, either foreign or local. If the development of the fields assigned to this company make it necessary for the YPFB to enter into this kind of agreement, I am sure that it will be done. A good example of this is the concessions given to Mr. Glenn McCarthy of Houston.

Q *How does the new Bolivian oil law compare with the oil laws of other South American countries?*

A The Bolivian petroleum code is similar to the Peruvian but is regarded as somewhat more liberal in certain respects, for example, in regard to the depletion allowance. The Bolivian and new Guatemalan code are regarded as the two most liberal in Latin America.

Q *What is the procedure to be followed by a private capital oil company which desires to operate in Bolivia? Will concessions be granted and (a) what is the maxi-*

mum amount of acreage that any individual or company may hold; (b) how much money must they put up to obtain such concessions; (c) what royalties must be paid to the Bolivian Government; (d) what other obligations must a private capital oil company undertake in order to become eligible to operate in Bolivia?

A The procedure as set forth in Article 39 of the Code is as follows:

The company or persons seeking to obtain a concession for the exploration and subsequent exploitation or direct exploitation of oil deposits shall present, personally or through an attorney-in-fact having sufficient powers, to the Bureau of Petroleum, the following documents: (a) written application; (b) sketch map of the concession applied for; (c) satisfactory demonstration of his economic ability; (d) memorandum showing his technical competence; (e) a receipt evidencing the deposit of the guarantee in the Banco Central of Bolivia to the order of the Bureau of Petroleum the following amounts: $U.S.0.20 (20 cents U. S. currency) per hectare in Zone I; $U.S.0.10 (10 cents U. S. currency) per hectare in Zone II; $U.S.0.05 (5 cents U. S. currency per hectare in Zone III.

The guaranty deposit for direct exploitation concessions shall be made in the manner indicated in the preceding paragraph and in amounts double the sums indicated above.

In case the concession applied for shall be denied in whole or in part, the whole or the corresponding part of the deposit shall be returned to the applicant.

As stated in reply to your first question, areas of up to 3 million hectares (approximately 7,410,000 acres) are available for exploration and subsequent exploitation or for direct exploitation, depending on geographic location.

The amount of the initial guarantee deposit required of the applicant for a concession varies according to size and location of the concession applied for (see above). A system of competitive bidding at auction is established in the event of applications involving identical or overlapping areas. The initial exploitation tax is payable according to the following scale: Zone I, 40 cents; Zone II, 30 cents, Zone III, 20 cents. The annual exploration surface tax is payable within 15 days following the granting of the concession. The tax amounts to from two to five cents per hectare, depending on the zone selected.

Article 104 of the code states that the state shall be entitled to a royalty, subject to reduction, equal to 11 percent of the crude oil and other products obtained from the concession.

The chief financial and drilling obligations of the concessionaire are incorporated in the reply to your first question.

Q *We understand that considerable geological and geophysical data are available in the archives of the Bolivian government. Will this data be made available to private capital oil companies or individuals desiring to enter Bolivia?*

A Any material consisting of geological and geophysical data that should be favorable to the operation of foreign oil companies will be made available under the special requests. In this respect, I just have to insist that the new petroleum legislation has been issued with the intention of vigorously pressing forward the development of our oil reserves. If such is the intention, then it is obvious that the government as well as all of the agencies related to the government will do everything in their power that is legal to help this final objective.

Q *Private capital oil companies, and particularly American oil companies and individual oil operators, are becoming more and more interested in the possibilities of developing the oil resources of South American countries. They have no intention of dominating in the countries where they operate. In view of the trend towards nationalism that has prevailed in Latin America during the past 30 years, can you say positively that Bolivia now has regained its confidence in the American oil operator? If so, what plan of campaign does the Bolivian Government plan to undertake to attract outside, and especially American, oil capital into the country?*

A The trends of nationalism in the American countries have suffered a tremendous change in the face of the threat by the Germany of Hitler and even more today by the threat of international Communism. The Second World War and the idealogical struggle that is going on today in the world has definitely convinced the countries that the countries which are similar in their ideals and in their objectives as citizens that do not stand together will fatally have to perish.

I strongly believe that the approach towards North American investments in Latin America is being modified accordingly. At the same time, there is undoubtedly an indication that American investments in Latin America are also modifying their approach. In former times, a concession was as good as the extremely favorable terms of that concession. Today, capital has to study whether such extremely favorably conditions will stand against the interests of the peoples of the country where the concession is made. In other words, today we have advanced quite a long way in a better appraisal of the mutual advantages in economic relations that will take into consideration the interests of all parties concerned.

In the specific case of Bolivia, after the tremendous fanatical attitude that had been developed by former leaders against oil concessions to foreign companies, it took a great courage and the certainty to be backed by an overwhelming majority of Bolivian peoples to take the step that has been taken.

In regards to a campaign to attract foreign capital to Bolivia, we will do everything in our power to furnish the data and to tell interested parties about the new trends in Bolivia. At the same time, we are laying the cards on the table and telling the truth about all the phases of our economic situation. When we say that the possibility for foreign investment is good in Bolivia, it is because we honestly believe that that is true and that we can substantiate that statement by showing a large amount of potentiality that is just waiting for capital in order to be developed.

—The End

Crewman loads the continuous strip camera equipped with extreme wide-angle lens in the nose of the survey aircraft. The strip camera records every foot of the flight path.

Australian Aerial Survey Reports Near Completion

Plywood plane adapted to conduct aeromagnetic reconnaissance to evaluate WAPET's Canning Basin holdings.

By HARRISON T. BRUNDAGE
World Oil Staff

Unique adaptation of a fast, plywood airplane to aero-magnetic reconnaissance of a vast desert area in northwestern Australia has made possible the surveying of an 80,000 square-mile area in three months flying time.

The Canning (or Great Desert) Basin is almost completely covered by a layer of windblown sand that makes surface geological work difficult and highly inconclusive. Definite Jurassic-age rocks have been identified at a few scattered outcrops, and all other known data indicate a sedimentary section of considerable thickness.

Under these circumstances, Western Australian Petroleum Pty., Ltd., decided upon a reconnaissance aeromagnetic survey to outline general geologic features of part of its 140,000-square mile Permit to Explore 30-H, and engaged Aero Service Corporation to do the job. Aero Service was completing compilation of records in Philadelphia in December, 1955, following a preliminary check by their Perth, Australia, office. Gravity Meter Exploration Company of Houston is doing the interpretation and final reports of the survey.

Flying commenced shortly after June 1, 1955, and all flights were completed by the end of August, 1955. About 80,000 square miles, bounded roughly by the Fitzroy river on the northeast, by a line running north 30 degrees east about 325 miles inland on the southeast, by the Throssell range on the southwest, and by the Indian Ocean on the northwest, was surveyed. This is all desolate and vir-

tually uninhabited desert country.

Base of operations was at Broome, in Dampier Land, noted for its 28-feet tidal variation. Aviation gasoline and other supplies were brought in by boat. Aero Service maintained a staff at Perth, WAPET's headquarters and nearest city of any size, for the basic map work. A servicing assembly for Aero aircraft and instruments was established at Sydney, which is Australia's principal city—for aircraft maintenance.

Aero used a small, hand-picked personnel group. Their adaptation of equipment, coupled with governmental cooperation and excellent weather, permitted this survey—halfway around the world from Aero's home office in Philadelphia—to be completed without serious operational problems. Costs of the survey were about the same as for domestic work.

The speedy, plywood De Havilland Mosquito was peculiarly adapted to this work. The magnetometer was carried inside the fuselage, ten feet forward of the tail wheel, unlike the conventional suspension of a trailing "bird" containing the instrument, as must be done in conducting aeromagnetic surveys using a metal plane. Only the engines and the tail wheel assembly contained sufficient metal to be factors influencing the magnetic field enough to be considered, and Aero Service was able to effect a special installation that minimized this distorting influence.

The Mosquito's great range, in this case 1750 miles, was an essential factor since all operational flights for the Australian work were to and from the 6000-foot airstrip (built during World War II) at Broome, on the coast. The area surveyed is so desolate that it was not feasible to set up a shuttle airport in the interior. As many as 1400 miles were surveyed in one day. Operating altitude was 2000 feet above sea level, with ground elevations varying from sea level to 1200 feet.

Sets of three northwest-southeast lines (running North 30 degrees East) 1¼ miles apart were run, with each set being 25 miles apart in the northwest-southeast direction. Some of the area near the coast was detailed on a somewhat denser pattern, so that the density pattern averaged one linear mile for every four square miles.

Base maps were compiled on a scale of 1:50,000 (or one inch to 4167 feet) from aerial photos acquired from the Royal Australian Air Force. About two-fifths of the Australian continent has been photographed from the air by the RAAF, including all of the subject area. The aerial photos also were a primary means of identification of the plane's location during flights.

Ordinarily, flights were made in the early morning, before the midday air turbulence which normally develops at the low altitude required in aeromagnetic surveys. Operational speed was 250 miles per hour, which is faster than the usual practice in surveys of this kind.

Aero Service reported getting good survey records. Aero's project manager, William Lucas, and Homer Jensen, also of the Philadelphia office, and head of the company's Magnetometer division, did much of the preparatory work, particularly on the installation of the instrument inside the plane's fuselage. Max Garroway, the pilot, was an Australian, as were the aircraft mechanics. Liaison with the government was handled by Morris Lawrence of Sydney, Aero's Australian agent.

The Mosquito used was built at the De Havilland Aircraft, Pty. plant in New South Wales, in Australia, and is one of two owned by Aero Service's subsidiary, Worldwide Surveys, Inc., both having been purchased from the RAAF as war surplus. The only real mishap during the operation occurred when one of the engines failed during a flight, and the plane had to return to Broome on one engine. The bearings were found to be burned out, and the engine was discarded. Another was available at Perth, and a DC-3 was chartered to fly the replacement engine to Broome.

WAPET expected to follow up this work rapidly with other exploration tools. In November, 1955, the company had four gravity and three seismic parties working in their permitted areas in Western Australia. The gravity contractor is Robert Ray of Houston. Two crews were working in Dampier Land. Another was working in the Exmouth Gulf area near Rough and Cape Ranges, and the fourth was about 75 miles north of Perth along the coast.

Geophysical Service Inc., of Dallas, WAPET's seismic contractor, had crews working in Dampier Land, in the Exmouth Gulf area, and 75 to 80 miles north of Perth, respectively.

Drilling was continuing in Western Australia. In the Fitzroy Basin, Associated Freney Oilfields, Ltd., was moving in to drill a deep test at Myroodah, 20 miles south of WAPET's Grant Range 1, a 13,500-foot hole on which drilling was suspended in November. Recently, Associated Freney plugged a test on the Nerrima dome at 9000 feet, also located in the Fitzroy Basin.

WAPET was continuing drilling at Rough Range and at Cape Range, a few miles farther north on an anticlinal peninsula protruding into the Indian Ocean. Brown Drilling Company, of Long Beach, Calif., is the drilling contractor for the latter work. Loffland Drilling Company of Tulsa, Okla., is contractor for the drilling at Grant Range. **—The End**

Improvised battery cart and resistance box for DC power supply for ground tests of the airborne magnetometer at Broome.

Soviet Cloak Lifted from Austrian Oil Industry . . .

Matzen-Auersthal Is Called Western Europe's No. 1 Field

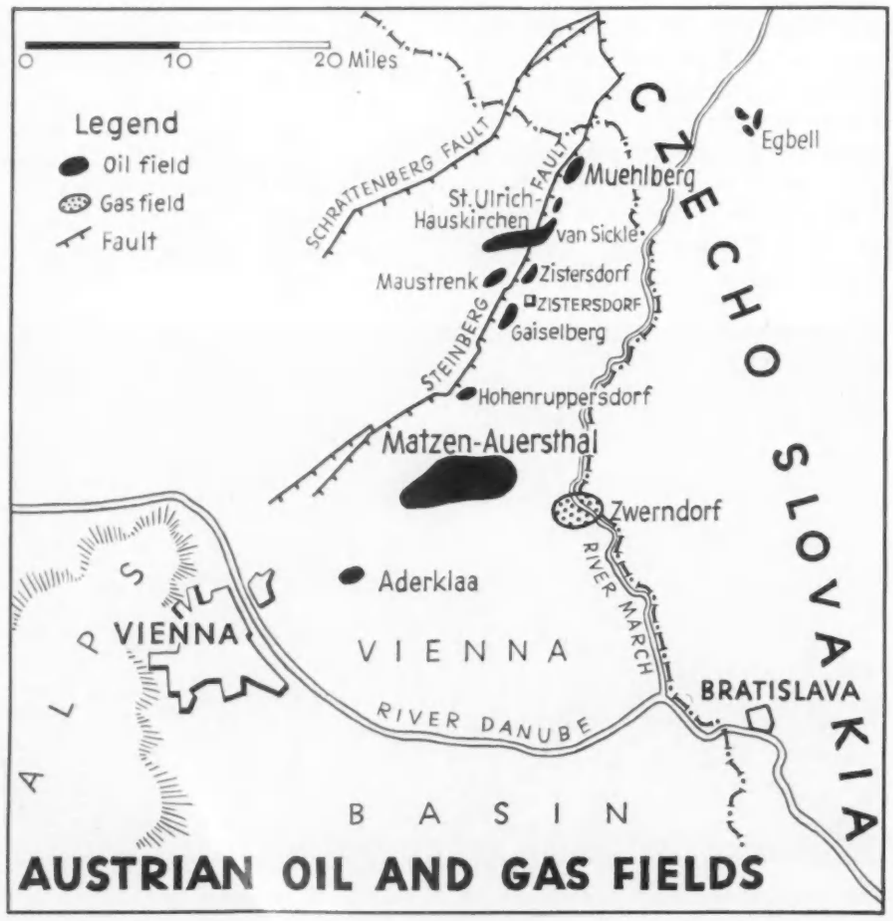
By A. M. STAHMER

JUST AS THE Venezuelan oil industry has been epitomized by Lake Maracaibo and the Russian oil industry by the town of Baku, the name of the small town of Zistersdorf in the wine-growing area between March field and the Moravian border has grown to become synonymous with Austrian oil.

The first Austrian oil fields were discovered near Zistersdorf in the early thirties. However, the fields developed in the immediate neighborhood of Zistersdorf soon were eclipsed by the oil deposits opened farther north near St. Ulrich-Hauskirchen and Muehlberg during the German occupation. And after the war, there followed the discovery of the extraordinarily productive oil horizons in the area of the villages of Matzen and Auersthal, located halfway between Zistersdorf and the Danube river about 20 miles northeast of Vienna.

Of the 24,844,000 barrels of oil produced in Austria during the past year, Matzen-Auersthal yielded 19,481,500 barrels, or 78.4 percent. Compared with this, fields in the immediate neighborhood of Zistersdorf, which are approaching their stage of natural depletion, have been reduced almost to insignificance.

Therefore, when Austrian oil is discussed today, it is imperative to mention first the name of the producing area which is of prime international importance and which may



AUSTRIAN OIL AND GAS FIELDS

FIELD INFORMATION

LOCATION
20 miles northwest of Vienna in area of Matzen and Auersthal villages

Production
19,481,500 barrels in 1955

PRODUCING WELLS
320 Total

Gas/Oil Ratio
60:1

Major Pay Zone
16th Tortonian

Depth
5200-5500 feet

Average Thickness
100 Feet

Well Spacing
650-1000 Feet

CHECK and COMPARE

the many advantages of

D+B PUMPS

Preferred for Half a Century by Experienced Oil Operators

- Designed and engineered for longer life, greater economy of operation and to cut down maintenance and adjustment.
- Built by expert workmen using the best equipment in one of the most modern pump plants in the world.
- Constant improvement in design, materials and workmanship for half a century.
- Tested under every conceivable condition in the oil fields of the world.
- Available in a complete range of sizes and types for any need.

Stop in today or call at your friendly CONTINENTAL or D+B store. Take advantage of our pump shop service. You'll find a complete stock of D+B Pumps, Parts and bulletins available.

CONTINENTAL
Serving the Oil and Gas Industries

CONTINENTAL SUPPLY COMPANY
A Division of The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas
Representatives in all principal oil fields of the world

D+B
• DEEP WELL PUMPS
• SUCKER RODS
• COUPLINGS

EMSCO
REG. U. S. PAT. OFF.

D+B DIVISION
EMSCO MANUFACTURING COMPANY
Garland, Tex. • LOS ANGELES, CALIF. • Houston, Tex.
General Sales Offices: Dallas, Texas

P—604

be considered the biggest of oil field of Western Europe. In 1955, Matzen-Auersthal yielded more than five times the volume produced by the major German field of Ruehlertwist-Ruehlermoor and between three and four times the volume credited to France's Parentis field.

Matzen-Auersthal is located within the former lease of the Rohoel-Gewinnungs AG., an affiliate of Socony Mobil Oil Company and Royal Dutch/Shell Group, the investigations of which by means of shallow core holes resulted in the discovery of several underground structures including that of Matzen late in the '30's. Exploratory activity in this area was interrupted by the war and was resumed by the Soviet Petroleum Administration in the postwar period. SPA, by continuing the work of RAG, struck oil in its second well, Matzen 3, with an initial daily output of about 1000 barrels from the Tortonian, in March, 1949.

Afterwards, the Soviets started systematic exploitation of this oil deposit. Not being acquainted sufficiently with the reservoir conditions, SPA overproduced some wells in the beginning. Generally, however, it is only fair to state that the Russians developed the field efficiently by studying its energy conditions and by consulting Austrian experts.

When the Soviets left, the management was put in the hands of the Austrian Petroleum Administration, which—still more systematically than the Russians—began trying to adapt the output of the individual wells to the energy conditions of the field.

It is evident from the double name that Matzen-Auersthal consists of two local uplifts of one geological structure extending approximately in the west-east direction. In the western part of the field, which has a present proven productive area of about 8 miles long and 6 miles wide, lies the dome of Auersthal limited by the Bockfliess fault in the west. The Matzen anticline adjoins in the east, its northern flank being cut off by the Matzen fault.

The most important pay of the field is the sixteenth Tortonian horizon with an everage thickness of 100 feet at a depth of 5200 to 5500 feet. About 180 of the approximately 320 wells produce from the sixteenth Tortonian, about 130 from other Tortonian horizons, chiefly from the 8th and 9th, and 10 from the Helvetian. The sixteenth Tortonian horizon yields 65 to 70 percent of the total crude output of Matzen-Auersthal, which currently is about 52,260 barrels a day.

About 90 percent of the wells producing from this main horizon produce average daily volumes of about 200 barrels of crude (specific gravity 0.907) through ⅛-inch to 1/6-inch chokes. The gas oil ratio is 60:1.

The reservoir rock is mostly subject to a powerful water drive from the south. The edge-water limit is well known, its encroachment being continuously controlled by seven wells. The top of the sixteenth horizon is taken up by as gas cap, which also is controlled by wells. The reservoir pressure of 140 to 150 atm. is constantly maintained above the critical pressure.

As soon as it is found that gas is being liberated from solution, the respective wells are shut down. A possible supplementation of the reservoir energy in the edge-water parts by secondary recovery methods is being considered. Russian production engineer Professor Krylow believes no waterflooding will be necessary at Matzen.

The Helvetian, which underlies the Tortonian at a depth of 5600 to 7500 feet, offers a reserve not yet fully explored. While asphaltic oil is recovered from the Tortonian, the Helvetian yields light paraffinic oil with a gasoline content up to 30 percent (specific gravity 0.820 to 0.835). Ten Helvetian holes producing to date were flowing wells at first, but had soon to be placed on the pump.

Acid treatments have been used to improve permeability. Also it is intended to use fracturing or multifracturing methods later on.

The exploration of the Helvetian is being carried on in the northern direction. Several wells have indicated that no oil should be expected in the deeper Flysch formation at Matzen, though this bed is among the productive strata of the northern Viennese basin.

Well spacings are relatively extended at Matzen, reaching an average of 650 feet and even 1000 feet in some parts of the field. Thirty-two drilling rigs are currently available to the Austrian Petroleum Administration, including two turbine drilling outfits developed by the Russians. Six rigs are used for exploratory drilling near Aderklaa, Kagram, Wittau, Rabensburg, and Goettlesbrunn (near Bruck on the Leitha).

Apart from the oilbearing formations, two natural gas horizons of the Sarmatian at a depth of 2600 to 3000 feet are producing at Matzen-Auersthal.

A 20-mile, 20-inch gas pipe line connects Matzen with Vienna. A 12-mile, 12-inch pipe line moves the oil from the field loading station near Bockfliess to the Lobau refinery.

East of Matzen, on the Czechoslovakian border, Soviets have discovered the major natural gas reservoir of Zwerndorf in the Tortonian, which, with respect to reserves, may be compared to North American or Italian gas deposits. The present drilling activity is extremely intense on the Slovakian side of the border. It is evident that Czechoslovakians intend to produce as much gas from the reservoir as is accessible to them.

The Aderklaa oil field located southwest of Matzen-Auersthal and almost in the outskirts of Vienna, already has exceeded its former peak output. Paraffinic crude with a specific gravity between 0.795 (partly condensate) and 0.823 is produced at Aderklaa from the 5th Tortonian horizon at a depth of 5600-5900 feet, this pay being under internal gas-drive. There are only two flowing wells among the 35 producers.

In 1955, 1,199,019 barrels of oil were produced. Center of the field is occupied by the small lease given to the Rohoel-Gewinnungs AG. during the last war. The Soviets have drilled several closely-spaced holes along the limits of this area in order to draw off the oil from below the RAG lease.

Austrian engineers are trying to produce Matzen field as rationally as possible with help of the available equipment and in consideration of existing reservoir conditons. Meanwhile, it is not known whether the country's economic means will permit a systematic exploration of those parts of the Vienna basin which still offer chances for finding additional oil or natural gas deposits.—**The End**

Field Well as good producer

SEAMLESS CASING used

WHEN Southland Royalty Company's Roy Parks, Jr. No. 3, located in the Headlee Field of Midland County, refused to produce, Southland called in The Western Company, of Midland, to fracture the formation. Over a million dollars worth of surface equipment was assembled at the site to gain the desired injection rate in the deep well.

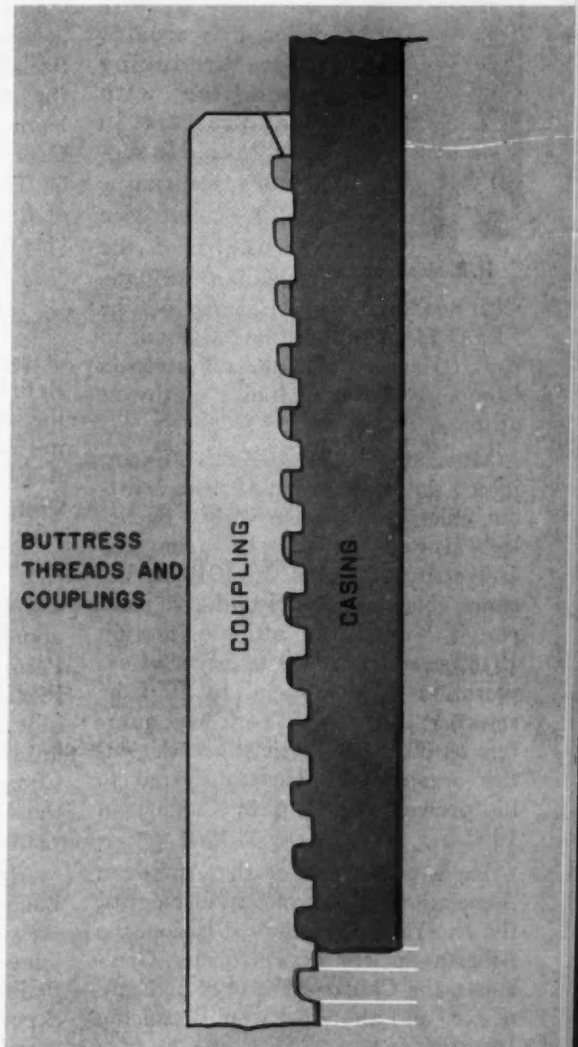
The well had been drilled to the Devonian, and NATIONAL *Deep-Well* and Buttress-Thread Casing had been run and perforated from 11,650 to 11,700 feet. Yet the well had made no commercial show of oil. The fracture treatment made the difference.

First, formation was broken down with crude oil at a pressure of 4800 pounds p.s.i. Then, 10,000 gallons of green oil, containing one pound of sand for each gallon, were pumped into the hole, followed by 290 barrels of flush oil. This stage of the treatment took just 19 minutes at an injection rate of 27.8 barrels per minute. Treating pressures averaged 5800 pounds p.s.i. Following stage one, an additional 38,000 gallons of oil and 18,000 pounds of sand were forced into the formation at a pressure of 6,000 p.s.i. Two days after treatment, the well potentialed 481 barrels of 48 gravity oil through one-fourth inch choke. Tubing pressure was 1700 lbs. and casing pressure was 200 lbs.

NATIONAL Seamless *Deep-Well* and Buttress-Thread Casing were especially developed for just such jobs as this. They possess the high collapse resistance needed to withstand the tremendous vibrations of deep well drilling, and in this instance the terrific stress of a high pressure frac job. The casing joints are designed to bear the weight of unbelievably long strings of casing. No wonder so many successful oil men inevitably say "NATIONAL SEAMLESS."

For full information on National Tube developments in the oil industry, write to National Tube Division, United States Steel Corporation, 525 William Penn Place, Pittsburgh 30, Pa.

NATIONAL TUBE DIVISION
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



The high tensile strength of the Buttress-Thread joint is due largely to the combined effect of the completely engaged runout threads and the three degree flank angle of the thread which support the weight of the casing in the well. The joint is comparable in strength to the body of the pipe. Buttress-Thread casing eliminates the need for upset-end casing—gives greater inside clearance for the drilling bit, and permits easier, faster coupling to power-tight position.

NATIONAL USS **SEAMLESS**

DRILL PIPE... CASING...TUBING

UNITED STATES STEEL

What's Happening

AMONG WORLD OIL MEN

H. R. MOORMAN, manager and executive vice-president of Mobil Oil of Canada, Ltd., has been named a member of the company's worldwide producing committee with headquarters in New York. His successor as manager and executive vice president of the Canadian affiliate, with headquarters in Calgary, will be FRED H. MOORE, now assistant to the president of Magnolia Petroleum Company, Socony Mobil's southwest affiliate.

H. R. Moorman

Moorman, a 51-year-old Texan, joined the company in 1939 as assistant chief geophysicist, with a bachelor's degree in physics from the University of Texas. In 1940 he became chief geophysicist of the company's Venezuela affiliate, and in 1948 became assistant manager of exploration in Venezuela. In 1951 he returned to the New York headquarters as chief geophysicist for the entire organization. He transferred to his present position in Calgary in 1952.

He is a member of the American Association of Petroleum Geologists, the American Geophysical Union, the Alberta Society of Petroleum Geologists, the Calgary Chamber of Commerce, and the American Petroleum Institute.

Moore, 46, a native of Comanche, Texas, received his bachelor's degree in geology from Texas Technological College in 1930 and his master's degree in geology from the University of Virginia in 1931. He spent two years in the graduate school of Yale University in the same field. He joined Magnolia Petroleum Company in 1935 as a field geologist in Oklahoma.

After working in oil fields in Texas, New Mexico, Kansas, Ohio and Illinois, he became a staff geologist in Magnolia's Dallas headquarters. In 1951 he took Harvard University's advanced management course and in the same year was appointed assistant to the president of Magnolia. He managed that affiliate's crude oil purchases and sales 2½ years.

Moore is a fellow of the Geological Society of America and a member of the American Association of Petroleum Geologists, and the American Geophysical Union. He is a director of Texas Technological College and of the Texas Mid-Continent Oil and Gas Association.

•

R. W. WELLS, formerly director of public relations for Husky Oil & Refining, Ltd., has been appointed to the Alberta Public Relations Committee of the Canadian Petroleum Association, replacing A. R. SMITH who resigned from the committee last year.

•

WILLIAM D. STUART has been appointed statistician of the Canadian Petroleum Association. He replaces RALPH W. DIAMOND, JR., who is leaving the association to take up an executive position with Triad Oil Company, Ltd. Diamond has been the CPA statistician for the past 3½ years.

After receiving his degree of Bachelor of Commerce from the University of British Columbia, Stuart joined the Land department of Imperial Oil Limited in Calgary in 1954, a position he has held until his new appointment to CPA.

•

STANLEY B. LAING, secretary-treasurer-comptroller, Bailey Selburn Oil & Gas Ltd., and JOHN W. LEHMAN, vice president and secretary, Trans Empire Oils Ltd., both of Calgary, Canada, have been elected to membership in the Controllers Institute of America.

Established in 1931, the Institute is a non-profit management organization of controllers and finance officers from all lines of business—banking, manufacturing, distribution, utilities, transportation, etc.

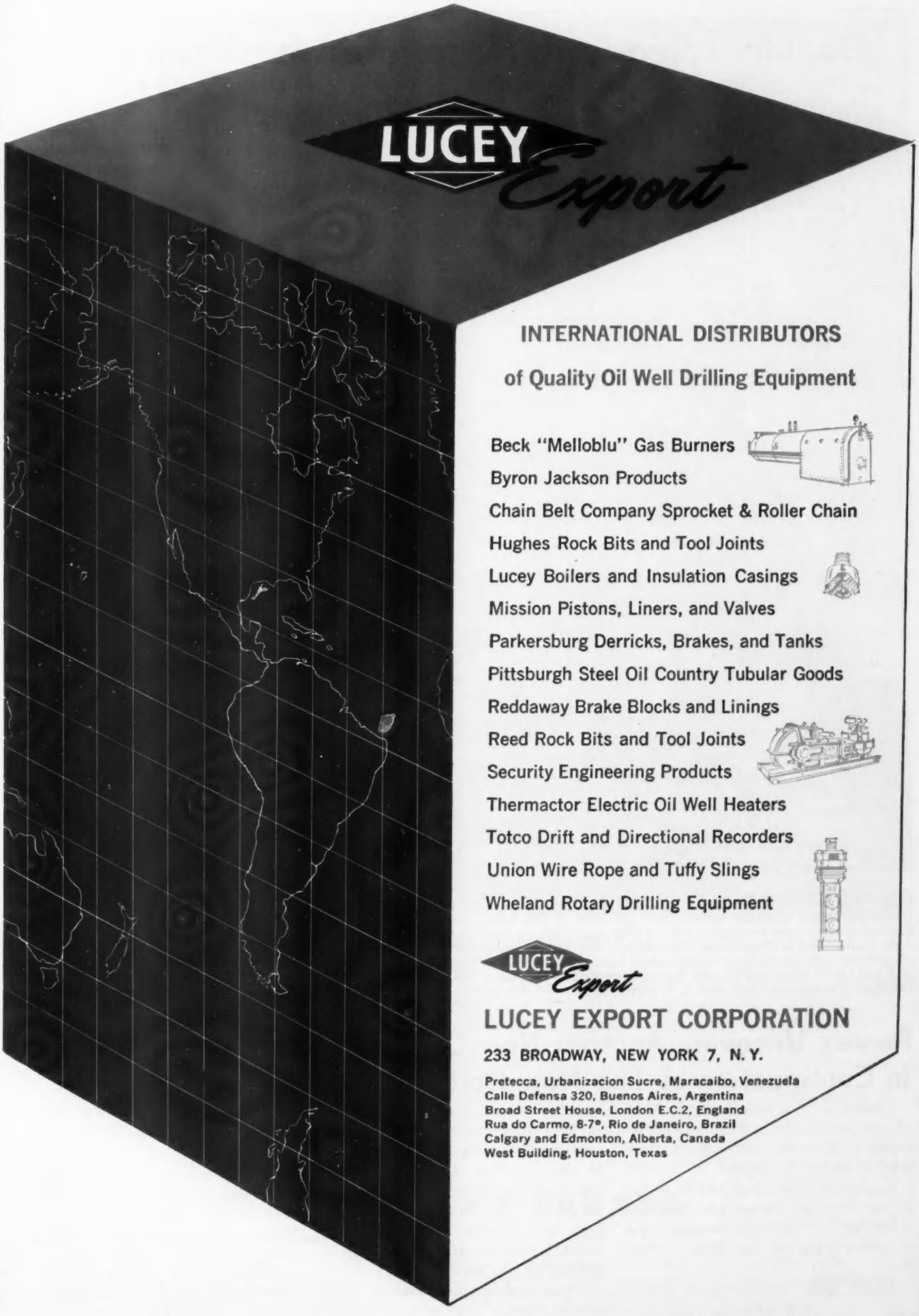
The following personnel changes have been announced by Creole Petroleum Corporation for the Venezuela divisions:

New appointments:

E. R. ADAMS, New Jersey, appointed head, Insurance section, Treasurer's department, Caracas; M. G. BALL, Charleston, S. C., appointed assistant refinery manager, viz F. K. Davis, Amuay. Ball's former position was superintendent, Caripito district, Eastern Venezuela.

DR. F. G. BAPTISTA, Coro, Venezuela, named assistant manager, Production department, Caracas; LIONEL J. BOURGEOIS, Donaldsonville, La., promoted from assistant manager to manager, Sales department, replacing W. B. CLEVELAND; Cleveland, Crosby, Penn., appointed manager, Amuay refinery, viz Calvin E. Cooper, retired; C. H. CREAMER, Santa Fe, N. M., appointed assistant manager, Sales department, Caracas, viz Lionel J. Bourgeois; J. H. CREAMER, Pecos, N. M., succeeds Lorenzo J. Mendive, retired, as head, Labor Relations section, Industrial Relations department, Caracas; F. K. DAVIS, appointed superintendent, Caripito district, Eastern Venezuela, to succeed M. G. Ball.

F. C. HENDRYX, Indianapolis, Ind., named assistant manager, Law department, Caracas; C. C. IRVINE, accepted a position as administrative assistant manager, Industrial Relations department of the Consortium Companies in Iran; D. C. MEYER, New Orleans, La., replaces G. C. Holcomb as assistant manager, Geological department, Caracas; JAMES S. McCLENDON, Minneapolis, Minn., named head, Commercial Affairs section, Law department, Caracas; H. J. O'MALLEY, New York, appointed manager, Law department, Caracas, replacing N. J. Campbell, elected vice president, New York; and BEN PURDY, appointed supervisor, Training section, La Salina, Western Venezuela. Purdy recently arrived from the U. S.



INTERNATIONAL DISTRIBUTORS

of Quality Oil Well Drilling Equipment

Beck "Melloblu" Gas Burners
Byron Jackson Products
Chain Belt Company Sprocket & Roller Chain
Hughes Rock Bits and Tool Joints
Lucey Boilers and Insulation Casings

Mission Pistons, Liners, and Valves
Parkersburg Derricks, Brakes, and Tanks
Pittsburgh Steel Oil Country Tubular Goods
Reddaway Brake Blocks and Linings
Reed Rock Bits and Tool Joints

Security Engineering Products
Thermactor Electric Oil Well Heaters
Totco Drift and Directional Recorders
Union Wire Rope and Tuffy Slings
Wheland Rotary Drilling Equipment

LUCEY Export

LUCEY EXPORT CORPORATION

233 BROADWAY, NEW YORK 7, N. Y.

Pretecca, Urbanizacion Sucre, Maracaibo, Venezuela
Calle Defensa 320, Buenos Aires, Argentina
Broad Street House, London E.C.2, England
Rua do Carmo, 8-7°, Rio de Janeiro, Brazil
Calgary and Edmonton, Alberta, Canada
West Building, Houston, Texas

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Rumania Ready to Negotiate War Claims

The Rumanian government has offered, in a note handed to the U. S. to negotiate a settlement of U. S. claims for war damages and property it has nationalized.

This would be a move of utmost significance. The retreat of Russia from the Rumanian oil industry made Rumania the sole responsible country in connection with its oil industry and any settlements of claims. Russia first began to move out of the Rumanian oil industry on Oct. 25, 1954, and completed the move Dec. 13, 1955.

While having to pay large sums for the 50 percent share which Russia held in the former joint companies, Rumania now faces large indemnity payments to the pre-war rightful owners.

The note was handed over by the Rumanian government to the U. S. ambassador in Bucharest. The note also said that discussions should be held concerning frozen Rumanian assets within the U. S. and on possible improvement of U. S.-Rumanian trade relations.

By May 2, it had not been made clear whether the U. S. had replied to the original Rumanian note.

The Rumanian action is believed to be a direct move against the U. S. Public Law No. 285 of the 84th Congress, enacted Aug. 9, 1955. This law provides for the seizure and liquidation of certain Rumanian, Hungarian and Bulgarian assets in the U. S. which were blocked previously under World War II controls.

Proceeds of the liquidation were to be used for the benefit of U. S. claimants against those countries. This law was made under the terms of the peace treaties which became effective Sept. 15, 1947.

The U. S. action last March in seizing $13 million in blocked Rumanian gold bullion was announced by the Justice Department on March 12, 1956, and marked the first implementation of Law No. 285.

Total U. S. claims against Rumania amount to a minimum of $88.5 million. The $13 million would not be included in any negotiations that may be held between these two countries.

D'Arcy Granted Libyan Concessions

D'Arcy Exploration Company (Africa) Ltd., subsidiary of The British Petroleum Company Ltd., has been granted three concessions totaling 5700 square miles in Cyrenaica and another of about 7000 square miles in Tripolitania. Thus, D'Arcy now has concessions on almost 13,000 square miles in Libya. At the signing of the agreement were, left to right, D. R. Macpherson, representative of D'Arcy; H. E. Salam al Qadi, minister of national economics, Libya; Anis al Qassim, chairman, Petroleum Commission, Libya; and K. R. Henshaw, also with D'Arcy.

Pemex Uncovers Another New Oil Field In Continuation of The New Golden Belt

Discovery of a new field on April 18 was announced by Petroleos Mexicanos, government oil company. New area is named Guillermo Prieto and is located between Reynosa and Brazil in the State of Tamaulipas. Government engineers consider the zone to be a continuation of the New Golden Belt.

Other fields discovered in recent months include Las Cañas, situated in the New Golden Belt 20 miles north of Poza Rica. Las Cañas 2 came in at 2794 feet. The field Boca de Lima, also a recent discovery, is situated about eight miles from the village of Gutiérrez Zamora. Boca de Lima 1 came in at 5907 feet and is producing 630 barrels a day.

Considerable importance is attributed to the area known as San Andres, 25 miles southeast of Poza Rica, where exploratory drilling is going on with excellent results.

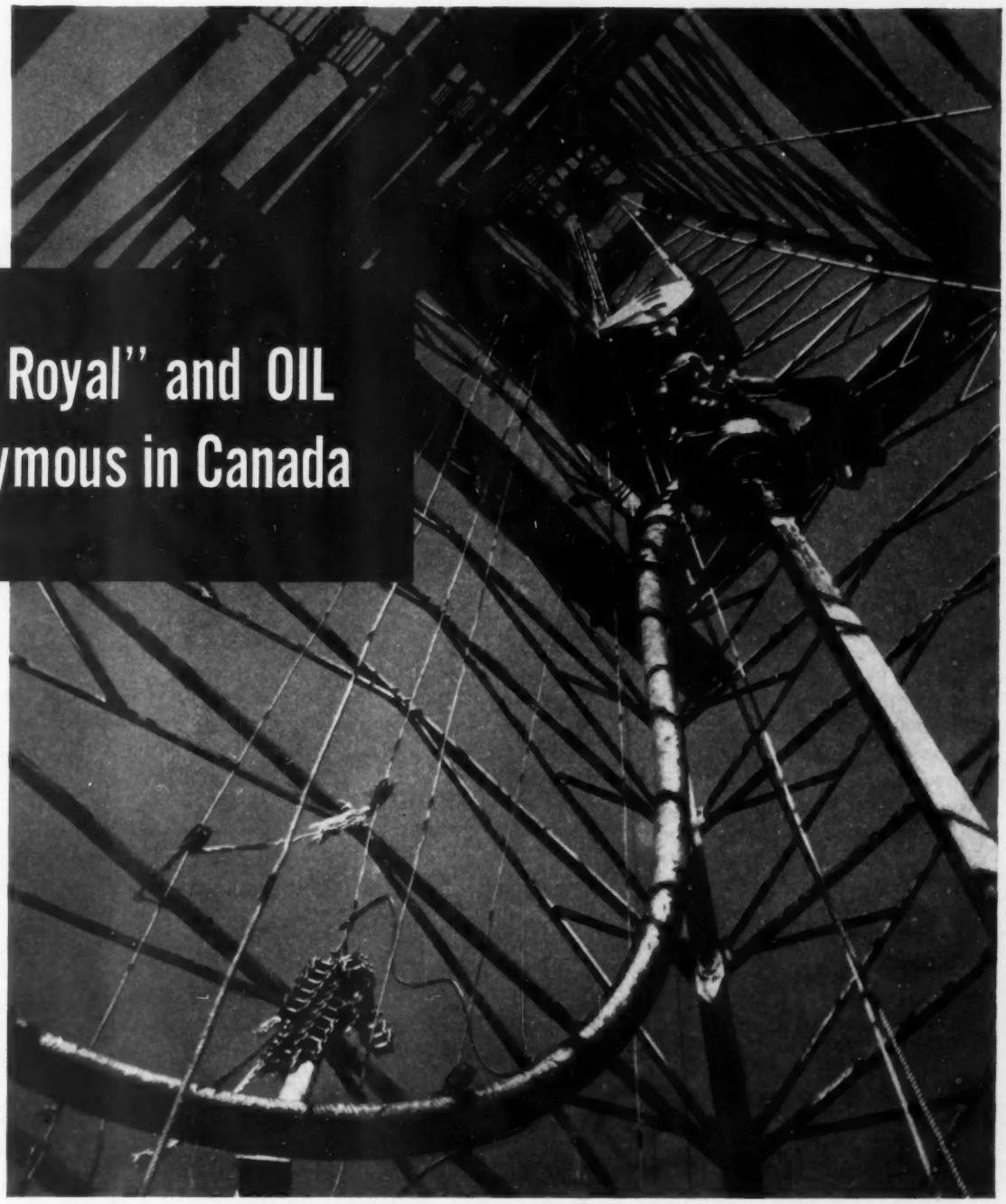
Canadian Oil Reserves Reach Peak in 1955

Reserves of petroleum in Canada rose to an all-time peak in 1955, according to the Reserves committee of the Canadian Petroleum Association. Petroleum reserves were increased substantially despite a record high production during 1955.

According to the report, these reserves represent the proved recoverable petroleum in the ground, the location and extent of which have been established by the industry's continuous drilling program. They do not include any estimates of petroleum which may be discovered in the future.

Highlights of the annual report, which is accepted as the most authoritative yardstick available on domestic proved recoverable reserves are as follows:

Proved reserves of petroleum rose to 2.757 billion barrels as of last December 31, an increase of 341 million barrels over the 1954 peak. Reserves today include 2.510 billion barrels of crude oil, and 247 million barrels of natural gas liquids.



"The Royal" and OIL synonymous in Canada

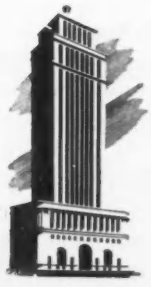
There are good sound reasons why The Royal Bank of Canada has long been familiarly known as "Canada's oil bank".

One reason is *experience*. "The Royal's" association with oil men dates from the earliest days of oil and gas development in Canada.

Another reason is *facilities*. Today more than 290 Royal Bank branches serve all the important areas of commercial oil production as well as many of the newer fields of active development and rich promise.

Each branch provides complete "on-the-spot" service to oil and gas men throughout the Western Canadian provinces. To supplement this service, the "Royal" maintains at Calgary a well-equipped and competently staffed Oil and Gas Department, geared to the specialized needs of the industry. Your enquiries are invited.

We do not provide information on oil securities.



THE ROYAL BANK OF CANADA

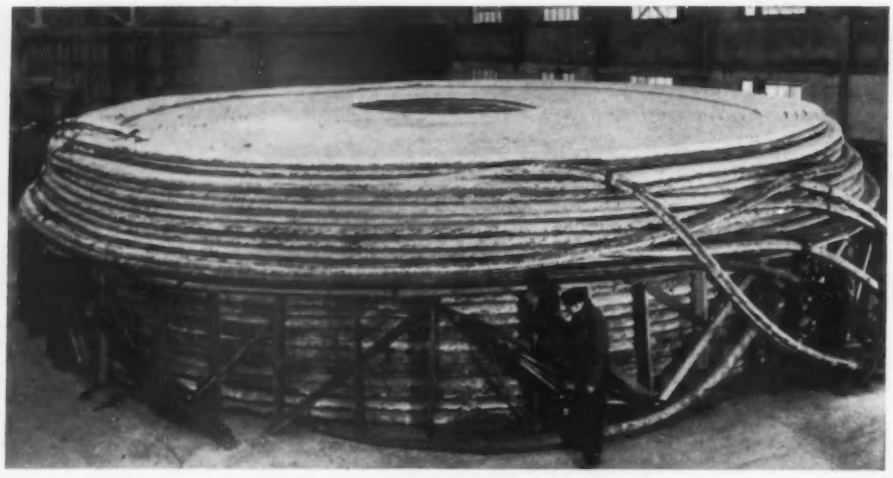
Canada's Largest Bank

Head Office: Montreal

Total assets exceed 3¼ billion dollars

Over 850 branches in Canada, the West Indies, Central and South America, New York, London and Paris.

The Royal Bank issues bulletins from time to time covering statistics, regulations, tariffs, oil and gas financing, and kindred subjects. These are free on request. For a list of current bulletins write to The Royal Bank of Canada, Oil and Gas Department, 409 – 8th Avenue West, Calgary, Alta.



This 1044-ton coil of finished cable is composed of 11 lengths of 2.7 km. cable and is about 11 feet high and 52 feet, 6 inches in diameter. It is part of the cable which will be used by Compania Shell de Venezuela in its Lake Maracaibo production station project.

Longest Submarine High Voltage Cables Being Laid

Compania Shell de Venezuela is laying a pair of high-voltage cables from a power station at Las Morochas on the eastern shore of Lake Maracaibo to a step-down transformer to be built on piles in the lake for distribution to production stations in the lake. Additional step-downs will allow operation of smaller electric motors using 440 volts.

The two 17-mile cables are the longest of their kind in the world, and are part of a $4.2 million program to provide electric power for the company's Lake Maracaibo crude production stations. The cables will carry up to 33,000 volts, to be stepped down to 11,500 volts by a big transformer in the lake. Voltage will be reduced again at the various production stations.

The cables were manufactured in 1¾-mile lengths which will be joined to form two continuous supply lines by use of submarine joint boxes.

12 Companies Are Granted New Turkish Concessions

As of Jan. 26, 1956, the following companies had been named by the Turkish information service as having received concessions pursuant to the new oil law there:

American Overseas Petroleum Ltd.; N. V. de Batafche Petroleum Mij; Bolsa Chica Oil Corporation; Deilmann Montan GmbH; Esso Standard (Turkey) Inc.; D. D. Feldman Oil and Gas Inc.; Gilliland Oil Corporation; Husky Oil Corporation; Istanbul Natural Gas Company Ltd.; Mobil Oil Turk, A. O.; Tide Water Associated Oil Company; Turkiye Petrolleri Anonim Ortakligu.

The last named is a 51 percent government sponsored company, operating existing production at Ramandag and Garzan fields in southeastern Turkey. By law, it must compete on an equal basis with private companies operating in Turkey.

Geologist Finds New Data On Israel Encouraging

Valuable geological information on actual and potential oil-bearing formations in Israel has been obtained in the course of extensive drilling operations carried out during the past two years by several groups of American, Canadian and Israeli operators, according to Douglas Ball, noted petroleum engineer and member of Ball Associates, oil and gas consultants of Washington, D. C. and Denver.

Writing in *Economic Horizons*, monthly publication of the American-Israel Chamber of Commerce, Ball says the three most significant facts revealed by the recent drilling are:

- The great thickness of total sediments in the northern Negev and the coastal plain.
- The change in character from deep sea types at the coast to shallower and perhaps continental types in the central Negev.
- Presence of the substantial quantities of producible oil shown in the Heletz well.

Analyzing results of drilling in different parts of the country, Ball points to significant data and newly-gathered information on Israel's stratigraphy supporting earlier geological interpretation pointing towards favorable conditions for oil accumulations.

Creole Budget Underscores Interest in Conservation

Recently Creole Petroleum Company announced its 1956 budget ($188 million), of which $77 million, or 40 percent, will be devoted to gas conservation and reservoir repressuring projects.

Work on the $31.2 million repressuring plant, Tia Juana No. 2, in Lake Maracaibo, is under way. Tia Juana No. 1, completed in 1955, has proved successful, and it is possible that Creole eventually will seek to repressure the pay sand in each major fault block of the Bolivar coastal fields in which it has production.

A third repressuring plant, Tia Juana No. 3, together with a gas gathering system, are under engineering study, and together will cost about $45 million.

Jointly with Mena Grande Oil Company, Creole is studying the possibility of a gas repressuring and cycling plant in the San Joaquin area, to cost $2.3 million.

Other major items in Creole's 1956 budget are increase in capacity of the Punta Gorda power plant from 42,500 kilowatt capacity to 57,500, a $3 million improvement program for La Salina mechanical shop, construction of two new supertankers ($10 million), and a drilling program of 154 development wells ($21.3 million). Another $24 million is allocated for exploration.

Yugoslavian Oil Output In 1955 Shows Increase

Belgrade sources report that 1955 crude production in Yugoslavia amounted to 4755 barrels daily as compared with 3998 barrels a day during 1954. At Kutina, output reached 3697 barrels daily, thus making this Serbian oil field the nation's No. 1 producer.

The 1955 production plan called for a daily average yield of 4992 barrels, while the 1960 govrenment figure is listed at 14,792 barrels per day.

There's a Torcon unit to meet your job requirements

Here is a complete line of torque converters designed to meet a wide range of engine applications in all industrial fields.

The Clark Torcon unit is a three-element single stage converter of simple design, mass-produced. It is available off-the-shelf to owners and operators of equipment, as well as to manufacturers.

HORSEPOWER RANGE
. . . 15 to 600

DIAMETERS
. . . 11" to 26"

COMPLETE CHOICE
of options for easy fit into practically any torque transmission system.

For full information refer to illustrated easy-to-read Torcon bulletin.

CLARK® EQUIPMENT

This helpful bulletin describes TORCON advantages . . .

Send for it

- **True Hydra-Foil Blade Design**
  —a patented feature. Correct combination of blade contour and angles assures smooth oil flow, for most efficient torque multiplication. No cavitation to cause turbulence or air pockets which impair efficiency and cause destructive wear.
- **Self-Contained Oil Circuit**
  —Sump is cast integral, and oil passages are cored in the housing. No unnecessary hoses and fittings; no external oil seals under pressure.
- **Easy Accessibility**
  —Inspection plates are easy to get at; no special tools needed.
- **Individually Cast One-Piece Elements**
  —no welds or fabrications to distort under extreme loads.

Every user of horsepower will find this bulletin well worth reading. The coupon brings your copy promptly—no obligation.

CLARK EQUIPMENT COMPANY
Jackson 16, Michigan

☐ Please send copy of The Torcon Bulletin

Name_____ Position_____

Firm_____

Address_____

City_____ Zone_____ State_____

a WORLD of OIL

By **DON KLIEWER,** WORLD OIL Staff

ALASKA: Through a contract with the U. S. Interior Department, Colorado Oil and Gas Corporation, Denver, has received oil and gas exploration rights over 1.2 million acres in the Icy Bay-Cape Fairweather area. Contract terms call for $1 million worth of exploration work by 1961, and a wildcat will be spudded in at least by July 1, 1959.

ARGENTINA: The Ministry of Industry reportedly is planning on seeking bids for the construction of a 1000-mile pipe line from Salta province oil fields to Buenos Aires.

AUSTRALIA: The Sun Oil Company of California will drill a test well about 200 miles west of Rockhampton in Queensland in an area where Kimberley Oil Exploration Syndicate of Perth holds a prospecting license . . . Woodside (Lake Entrance) Oil Company has reported an oil showing between 1325 feet and 1500 feet in its Well 2 at Gippsland, Victoria.

AUSTRIA: Under discussion in Vienna are plans for a natural gas pipe line to connect industrial centers in Styria and Lower Austria with natural gas deposits if development of the latter warrant.

BARBADOS: Barbados Gulf Oil Company has reported a gas-distillate discovery.

CANADA: Forty-five indicated oil or gas discoveries were made in Western Canada during the first quarter of 1956 . . . General Petroleums of Canada Limited has purchased its sixtenth drilling rig . . . Saskatchewan's January crude production of 1,369,-575 barrels was more than double the 670,343-barrel total reached in January, 1954 . . . British American Oil Company, Ltd., reportedly will acquire outstanding capital stock of Canadian Gulf Oil Company, wholly-owned subsidiary of Gulf Oil Corporation.

CHINA: Sizable quantity of crude reportedly has been discovered in the northwest area of Chinghai province.

COLOMBIA: John W. Mecom, Houston, Texas, is providing 75 percent and Colombian Oil Company 25 percent of the capital for a $20 million offshore oil venture in the Tolu Bay and Morrosquillo Gulf under terms of a concession granted recently by the government.

CUBA: Cuban American Drilling and Exploration Company's Cristales 1 in the Quadreny Primera concession, which was spudded in November 1, 1955, has been temporarily abandoned at 8344 feet after several oil and natural gas shows were reported . . . Cuban American's Guayos 1 test, also in the Quadreny Primera concession, was drilling ahead at 4522 feet without oil or gas shows . . . Trans-Cuba Oil Company's Manzanillo 1 test, in Agua III concession, was drilling ahead at 1900 without any reported oil or gas shows, according to Cuba Petroleum News Digest.

DENMARK: Danish-American Prospecting Company has begun an effort to find oil in North Sealand. The company has been exploring for several years in Denmark, but no com-

TK-2 *Plastic Linings*

APPLIED
BAKED
INSPECTED

under laboratory-strict conditions

Tube-Kote's exacting inspections, matching research laboratory standards, mark every processing phase of applying corrosion and paraffin resistant TK-2.

That is why more than 15 million feet of TK-2 plastic lined pipe is being used in major oil fields throughout the world—why more oil companies specify Tube-Kote TK-2 plastic lining for pipe protection than any other lining.

Learn the facts about TK-2, the plastic lining made best by 16 years of research, proved best by field use.
Write for 1956 TK-2 literature.

TUBE-KOTE

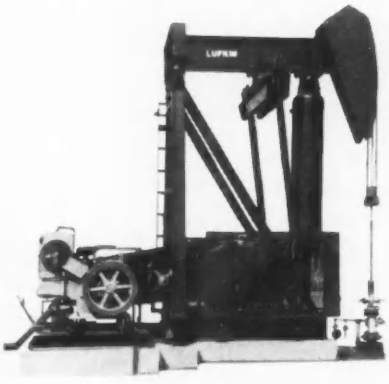
SERVICE MARK
REG. U.S. PAT. OFF.

TUBE-KOTE, INC.
P. O. Box 20037
Houston 25, Texas

PIONEERS IN PLASTICS SINCE 1939
MANUFACTURERS-EXTRUDERS OF PLASTIC PIPE FOR THE OIL INDUSTRY
Factory-trained field engineers available for consultation in all principal oil areas.

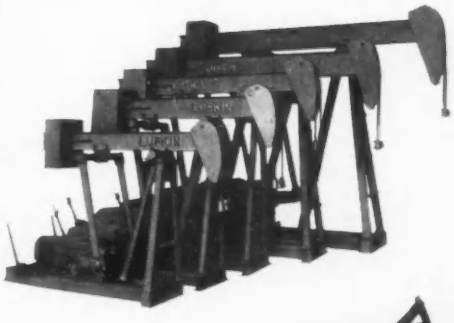
LUFKIN *Presents...*

THE ABC'S OF ECONOMICAL PRODUCTION



A AIR BALANCED UNITS

For compactness, light weight and ease of installation. Available in sizes ranging from 80,000 in. lbs. peak torque and 19,000 lbs. polished rod capacity to the mighty A-912DA-192-42 with 912,000 in. lbs. peak torque, 192 inch stroke and 42,000 lbs. polished rod capacity.



B BEAM BALANCED UNITS

Where economy is an important factor and dependability a prime consideration. Sizes from the B-10D-20-4 with 10,000 in. lbs. peak torque and 4,000 lbs. polished rod capacity to the B-57D-42-10.5A with 57,000 lbs. peak torque and 10,500 lbs. polished rod capacity.

C CRANK BALANCED UNITS

The all purpose unit known the world over for its ruggedness, trouble-free performance, and low cost maintenance. Sizes from the C-25D-24-6 with 25,000 in. lbs. peak torque and 6,000 lbs. polished rod capacity to the C-912DA-168-30 with 912,000 in. lbs. peak torque and 30,000 lbs. polished rod capacity.

Plus... LONG STROKE HYDRAULIC UNITS

For deeper wells and heavier fluid loads where high rod stresses are encountered. Rod life is greatly increased by this unit's slow, cushioned reversals and uniform polished rod velocity which avoids high peak loads. Available in 35,000 lbs. polished rod capacity and 20 ft., 25 ft., and 30 ft. stroke lengths.

Lufkin **FOUNDRY & MACHINE COMPANY**

LUFKIN, TEXAS

Branch Sales and Service: Houston • Dallas • New York • Tulsa • Los Angeles • Seminole • Oklahoma City • Corpus Christi • Odessa
Kilgore • Wichita Falls • Casper, Wyoming • Great Bend, Kansas • Effingham, Illinois • Duncan, Oklahoma
Brookhaven, Mississippi • El Dorado, Arkansas

Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 9950 65th Avenue, Edmonton, Alberta, Canada
3913 18th Avenue, Regina, Saskatchewan, Canada

mercial deposits of oil have been discovered.

EGYPT: Sahara Petroleum Company's wildcat at Burg el Arab in the Western desert was drilling ahead at 10,000 feet . . . Sahara Petroleum, formerly The Egyptian American Oil Company, has spudded in another test at Wadi Natroun, on the edge of the Nile delta.

INDIA: Assam Oil Company has discovered oil at 10,000 feet in a new well drilled at Nahorkatiya.

IRAQ: Mosul Petroleum Company has discovered oil at its Sassan wildcat, about five miles northwest of Tel Afar and 25 miles southwest of the company's Ain Zalah oil field.

PAKISTAN: Pakistan Petroleum Ltd. is continuing seismic operations on the Khairpur dome . . . Meanwhile, Pakistan Petroleum has discovered oil about 18 miles from Chakwal Tehsil in Jhelum district at 12,000 feet.

RUSSIA: The Oil Industry Ministry has forecast a rise in crude output of about 90 million barrels from 1955 which, if fulfilled, would boost total crude yield to a possible 600 million-barrel plus level.

SAUDI ARABIA: Arabian American Oil Company has commenced construction of a 22-inch, 120-mile crude pipe line from Safaniya oil field to the Ras Tanura refinery. The line is scheduled to be completed early next year, and initially will carry 50,000-75,000 barrels of 28-gravity crude daily from Safaniya's 15 wells offshore and two onshore wells.

SICILY: Ragusa oil field currently is producing about 6500 barrels daily; however, it is reported that by the end of 1956 output will be at the 13,000-barrel-a-day rate . . . The pipe line being constructed between the Gulf Oil Italia field in Ragusa and the RASIOM refinery in Augusta is expected to be completed in August or September.

TURKEY: The Deilmann Company of Dusseldorf reportedly has discovered an oil structure in Erzerum zone in eastern Turkey, with two exploratory wells reaching oil at 9042 feet . . . Additional exploration activities are scheduled to be carried out in Kars zone.

WESTERN GERMANY: Gewerkschaft Elwerath's test well Elsfleth 2a, five miles northwest of Elsfleth town, has found oil—the first discovery in the Lower Weser river district . . . Bramstedt 13, a joint interest of Dea-Mobil Oil-Preussag, has discovered a new oil-bearing sandstone in Holstein oil field, and was producing about 225 barrels of oil daily through ⅛-inch choke . . . A total of 567 deep wells was drilled during 1955 . . . Total daily average crude production from the nation's 67 producing fields amounted to 62,713 barrels during February.

VENEZUELA: Creole Petroleum Corporation plans to build a 34-inch, 16-mile crude line from Bachaquero to Lagunillas at a cost of $2 million; a 28-inch, 94-mile crude line between Temblador and Caripito ($5.6 million); and a new pumping station at Lagunillas—all in connection with the recent dredging of a 36-foot deep channel in the mouth of Lake Maracaibo, which will enable supertankers to leave the lake with a full load.

WHEELING
COUPLINGS
FOR OIL COUNTRY USE
LINE PIPE COUPLINGS A.P.I.
⅛" to 12"—Seamless and Special Processed—Black or Galvanized
PLAIN TUBING COUPLINGS A.P.I.
1" to 4"—Seamless
EXTERNAL UPSET TUBING COUPLINGS A.P.I.
¾" to 3½"—Seamless
CASING COUPLINGS A.P.I.
4½" to 13⅜"—Long or Short
HYDRAULIC COUPLINGS
⅛" to 4"—Seamless
REAMED AND DRIFTED A.I.S.I.
¾" to 12"—Seamless or Special Processed
DRIVE PIPE COUPLINGS
⅜" to 12"—Seamless or Special Processed
Sales Offices in Leading Cities
Albany, N. Y.—Albert L. Becker, 434 Clinton Ave.
Baltimore, Md.—Ted Barto, 2301 N. Charles St.
Chicago, Ill.—Harry A. Jay, Suite 1090, Old Colony Bldg.
Denver, Colo.—Earl H. Jones & Co., 1863 Wazee St.
Detroit, Mich.—R. W. Lang, Jr., 505 Park Avenue
Erie, Pa.—R. J. Maggi, Box 711
Falmouth, Mass.—Walter S. Bennett, 53 Minot St.
Houston, Tex.—Henry H. Paris Distributor, Inc. Box 932
Los Angeles, Cal.—James A. Riordan Co., 1400 Santa Fe Ave.
Louisville, Kentucky—Sid. Schultze Co., 514 W. Main St.
Milwaukee, Wisconsin—M. A. Nelson Co., 3347 N. 97th St.
Minneapolis, Minn.—Lin J. Krause, 5605 Lyndale Ave. S.
Narberth, Pa.—J. W. Worthington, 105 Forrest Ave.
Newark, N. J.—Ira L. Rothenberg & Assocs., 398 Market St.
New York, N. Y.—Max Rothenberg, 11-05 38th Ave., Long Island City
Omaha, Nebraska—Wm. Freiden, Central States Engineering & Sales Co., 5101 Blondo St.
Oswego, N. Y.—Northeastern Associates, Neil Chatterton, Secy., P. O. Box 284
Portland, Ore.—Earl H. Jones & Co., 1233 NW 12th Ave.
Richmond, Va.—P. C. Abbott & Co., 15 E. Franklin St.
San Francisco, Cal.—Earl H. Jones & Co., 1150 Folsom St.
Seattle, Wash.—Earl H. Jones & Co., 819 Thomas St.
TOP QUALITY Since 1918
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
Factories at WHEELING, W. VA. and WOODLAKE, CALIFORNIA

Prompt Service . . .
and a bonus!

WELDED PIPE
from J&L SUPPLY

Would you like a little bonus – in sincere appreciation of your pipe business? It will come to you from J&L in the form of the very finest service – the kind you deserve.

All right, get your J&L Store on the telephone and the bonus is yours! Moreover, we'll oblige promptly.

To refresh your memory . . .

J&L Buttweld and Lapweld are made to API 5-L specifications. Single lengths 1¼" and smaller; single or double random lengths sizes 1½" to 4" inclusive. Commonly supplied threaded or with plain ends; plain ends beveled or square cut. Regular mill coating, or uncoated for field wrapping.

JL PIPE

Jones & Laughlin

SUPPLY DIVISION – Tulsa

SERVING THE UNITED STATES AND CANADA

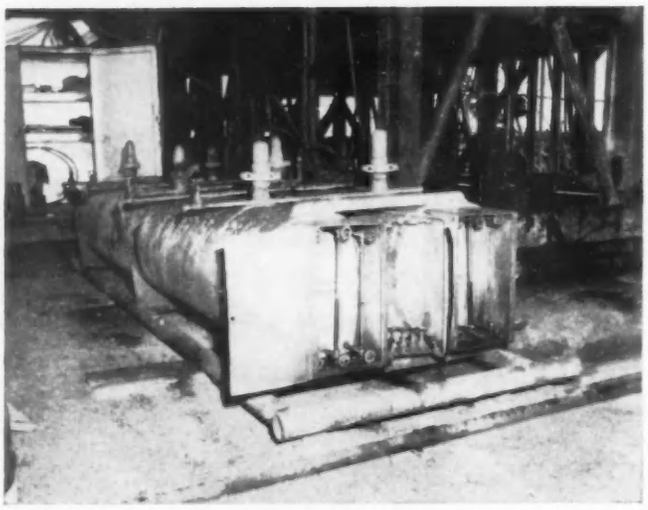
5-S

DRILLING HINTS

These **How-To-Do-It** Ideas Can Save You Money

$10 is paid for each illustrated acceptable contribution. Mail to The Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

Lubricant Tanks Prevent Contamination

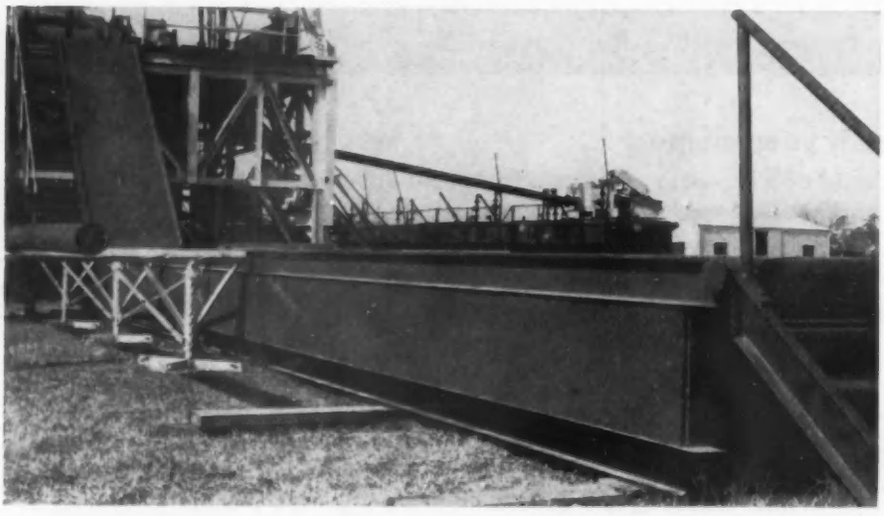


Fuel and lubricants at the rig can be kept free of contamination due to dust or water. The tank is filled by a tank truck which connects to one of the filler pipes with quick acting unions and plugs. Fuel and lubricants are then supplied to their points of use by means of a slight air pressure on the tanks.

After the tanks are mounted on skids, air lines are connected to the top of each tank through a reducing regulator, and a safety pop valve is provided on the side. The outlets are of ½-inch pipe and the cluster of valves shown at the front between the gage glasses is used to control the flow to each of the places where fuel or lubricants are being used.

In the case of the engines, the lubricant is connected directly to the crank cases so that proper level may be maintained by simply cracking a valve. When time to change oil, old oil is drained and the new replaced without the least chance of contamination. The same is true of the fuel, which is connected directly to the diesel injectors on the engines.

On various assemblies such as rotary chains, the line leads to a sight feed from which the flow can be controlled easily.



Build Double-Purpose Junk Bins

Make the most use out of every piece of rig equipment and cut down on rig transportation costs. One contractor followed this thought and made extra long, heavy, braced pipe and junk bins. When the bins were unloaded on a new location, the bins were turned bottom side up and winched into place to form the walkway between the pipe racks.

Eight-inch "I" beams formed the main brace work for the bins with heavy gage sheet metal on the sides. Non-skid metal formed the well-braced bottom of the bin and formed a sure footing for the walkway when the bin was on location.

This arrangement greatly decreased rigging up time as there were no walkways to assemble and level. When tearing down, after the pipe had been laid down, the bins were turned right side up and loaded with water lines, fittings, subs, and other pieces of rig equipment dismantled for a move.

"When I want a **HOLE OPENER**

"When I want a **3-CUTTER BIT**

"When I want a **4-CUTTER BIT**

I CALL *HCSmith* – because Smith makes 'em all!"

You don't have to shop around, because there's an H. C. Smith Bit or Hole Opener to handle every type of formation all the way from spudding-in to the bottom of the well...and you have your choice of either 3-cutter or 4-cutter types.

Don't take our word for it—ask the many drillers who use Smith Bits and Hole Openers by their own choice. They may not talk about the all-forged bit bodies that give extra strength, the scientific tooth designs and patterns or the triple-bearing construction of Smith Bits and Hole Openers, but they can sure tell you about fast footage in all types of formations, the long, trouble-free life, and the ease of keeping the hole straight when you use H. C. Smith Bits and Hole Openers from top-hole digging to total depth.

OUR 20th YEAR
HCSmith
OIL TOOL CO.

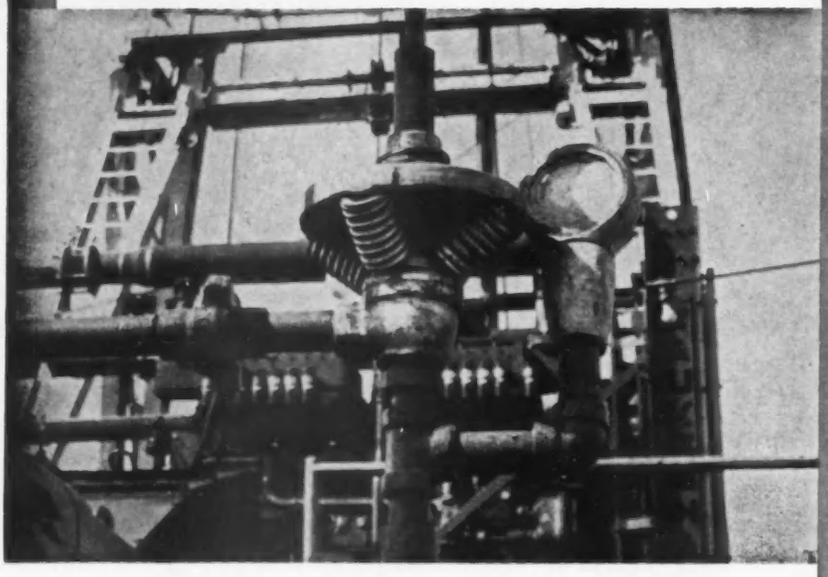
- every bit as good as the best

H. C. SMITH OIL TOOL CO.

GENERAL OFFICES, EXPORT OFFICES AND PLANT: COMPTON, CALIF.
BRANCHES IN ALL PRINCIPAL OIL CENTERS IN THE UNITED STATES AND CANADA

Only Kinzbach

AUTOMATIC MUD RELIEF VALVES GUARANTEE CONSTANT MUD PRESSURE



When overloads occur, the Kinzbach Model 112 Valve relieves the system instantly of the overload surge. Line pressure is maintained at a pre-set level, thus reducing the danger of a blowout. And, in case of momentary blockage, circulation is restored immediately, eliminating the danger of suspended cuttings settling and causing stuck pipe.

If the system overloads repeatedly, the 112 Valve will cycle rapidly without chattering and without damage, and without dropping the line pressure below the pre-set level, until the cause of the overload can be removed. Pump surges, which can be as high as 40% over normal pressure, do not affect valve operation so long as the proper valve for the service is selected and the pop-off pressure is properly set.

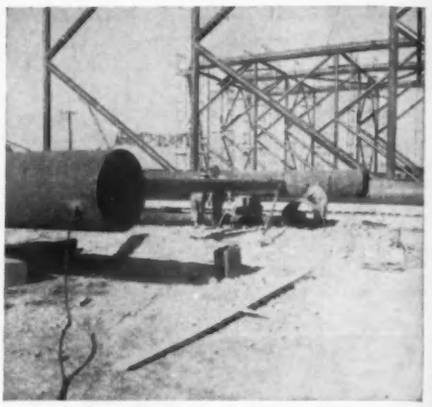
This is only part of the story of Kinzbach Model 112 Automatic Relief Valves. No other valve can offer so many advantages for safe operation as the Kinzbach Model 112 Valve.

Write for complete data or consult your Composite Catalog.

KINZBACH TOOL CO INC

P. O. BOX 277 HOUSTON, TEXAS

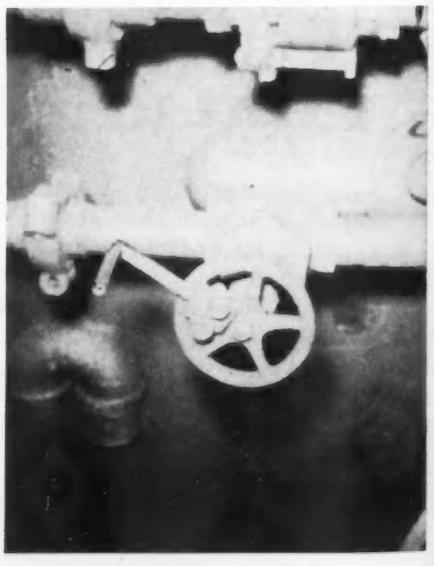
Export Office: 74 Trinity Pl., New York, N. Y.



Provide Permanent Ground When Welding Platforms

When offshore platforms and various other large structures are assembled by welding, time can be saved when connecting the ground cables from the welding machine.

The ground cables are strung from the welding machine generators and the end is welded fast to the first, or base, piece of the structure. Then as the structure is assembled, the ground will be already in place. As soon as each piece is positioned the welder can move right along without changing his ground line or having it accidentally knocked loose. The cables are left hooked-up until each structure is completed and ready to be moved out of the yard.



Cheater on Handle Aids Valve Operation

Sometimes it is necessary to use a "cheater" on gate valves to get positive seal or to open the valve if it has been closed a long time. In many in-

stances this chore is performed with a 24-inch pipe wrench, a piece of pipe or any other tool that might be at hand.

One operator has found a unique way to fasten a cheater to the valve handle without welding it. A ⅜-inch rod about one foot long is heated and about four inches of the rod is bent over at right angles. The long end of the rod is placed on one of the spokes of the valve wheel and secured with a wire line clamp. Size of clamp will vary with the size of the wheel spokes.

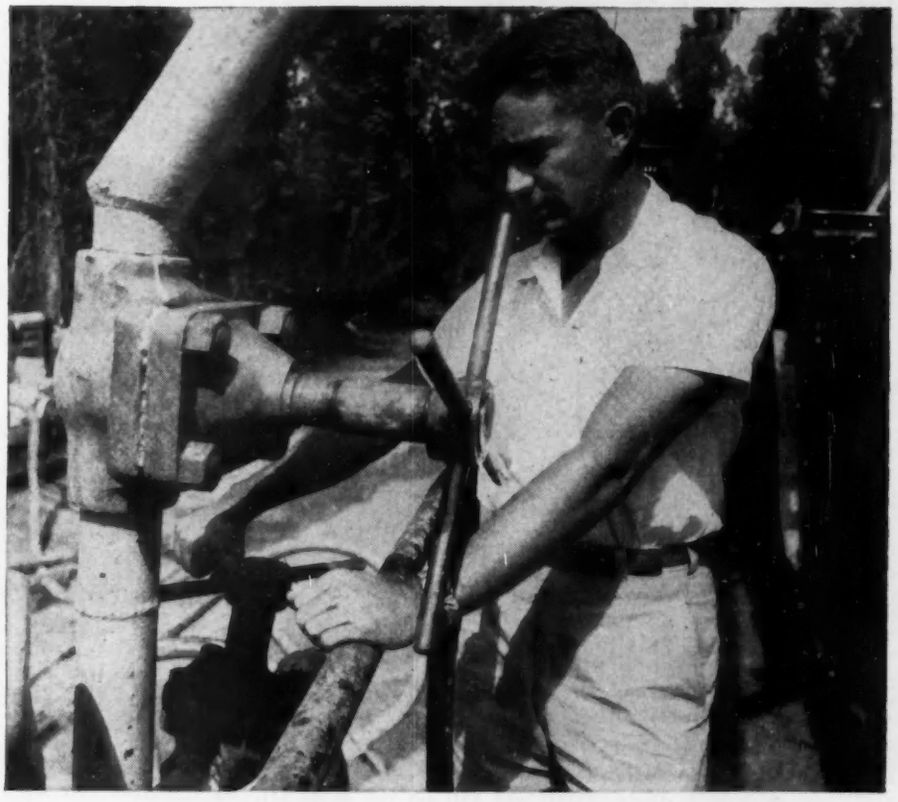
Rig Skid-Mounted Cradle For Traveling Block

When necessary to tear down a standard rig, or to lay down a jackknife rig, and unstring the blocks for moving, a convenient skid-mounted cradle can be made for the traveling block. This cradle is placed under the blocks and the blocks are lowered into the cradle. The photo shows this operation for a jackknife rig.

The cradle is made from 3-inch pipe with risers so that the blocks are held at a convenient height for unstringing and stringing up. The upper part of the cradle frame has cross pieces which fit the contour of the blocks. To hold the hook level, a raised saddle is placed in the center of the cradle to hold the neck of the hook.

When necessary to lower the rig, the catline is strung through one side of the hook, using a yolk to prevent cutting the catline, and the hook is pulled about half way up the rig. Tension is maintained on the catline while the rig is being lowered, and as soon as it is down, the cradle is spotted. Then the catline is slacked off and the blocks are lowered into the cradle. The blocks are unstrung in the usual manner and the skid-mounted cradle is sucked up onto a truck for moving.

Tips on Mud Valves for Toolpushers . . .



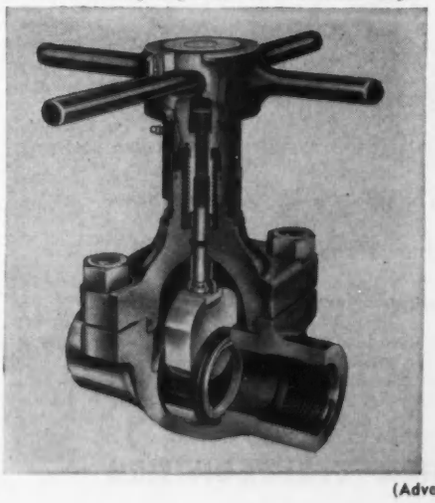
Allen Woolf closes a MUDWONDER valve on the fill-up line of Woolf & Magee Rig #11

MUDWONDER Mud Valves Go Over 100,000 Feet Without New Parts

by Allen Woolf, Toolpusher, Rig #11 • Woolf & Magee Drilling Contractors, Tyler, Texas

WHEN you can drill 71,000 feet of hole and ream another 30,000 without replacing mud valve parts you have good mud valves. Our Rig #11, completely equipped with Rockwell-Built Edward MUDWONDER mud valves, made this record of over 100,000 feet and continued to operate without mud valve repairs.

MUDWONDER cut-away view shows the double thread construction, separated stainless stem and hard chromed gate with "T" slot connection and the one-piece seat insert with the buna-N molded integrally over the steel wear rings.



Economy is the watchword in slim hole drilling and the MUDWONDER certainly has proved economical for every slim hole service whether on the standpipe, fill-up or release line.

Since we installed MUDWONDER valves downtime and repair costs have been cut greatly. In fact, mud valve downtime has been zero. No parts have been replaced and no valves have failed.

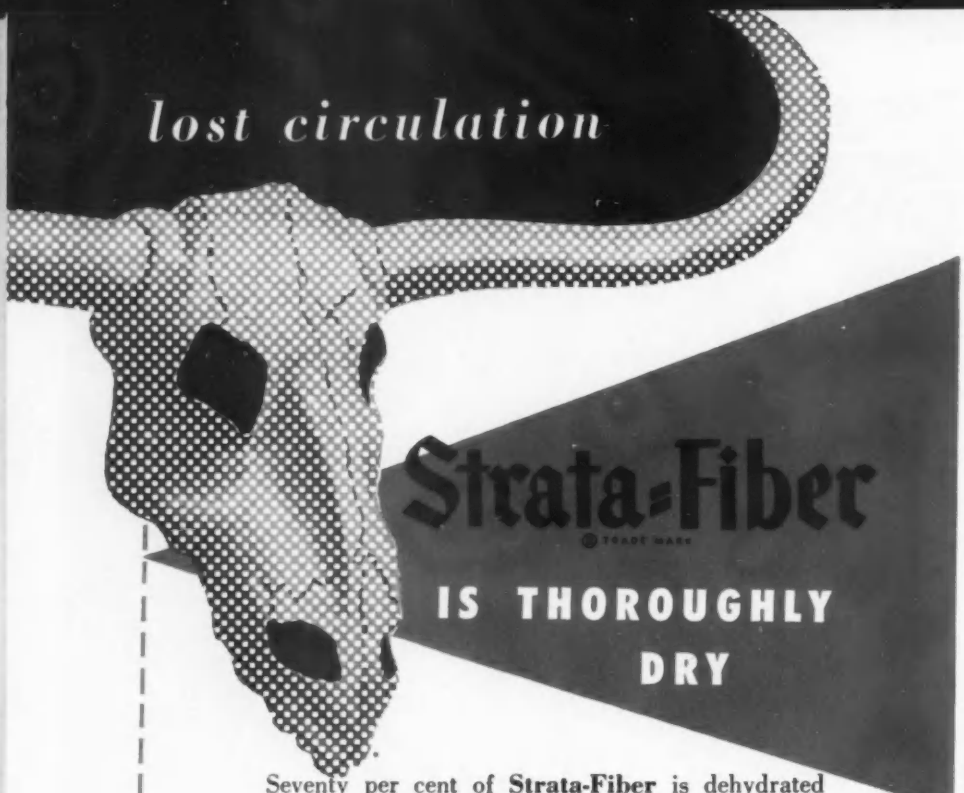
Besides solving maintenance problems, these MUDWONDER valves solved another problem encountered from time to time, especially in the Louisiana area where Rig #11 has been drilling. Sanding up of valves has always caused trouble in this area but, even with extremely high sand content mud, the Mudwonder has never failed to operate. It always opens or closes easily regardless of the pressure.

I can recommend MUDWONDER to any toolpusher having mud valve trouble. MUDWONDER valves are built in 2", 3", and 4" sizes with screwed or flanged ends for 2000 psi WP (4000 psi test) and 3000 psi WP (6000 psi test).

See your favorite oil field supplier for complete information, or write Edward Valves, Inc., East Chicago, Indiana. Quick shipments can be made from East Chicago or the Edward warehouse in Houston through the supply store you select.

(Advertisement)

lost circulation



Strata-Fiber®

IS THOROUGHLY DRY

Seventy per cent of **Strata-Fiber** is dehydrated fibers from the inner rind of sugar cane bagasse. But these fibers have been so thoroughly dried that you buy *more* active lost circulation material per pound than with any similar product. This extra drying plus the fact that **Strata-Fiber** is made from the tough inner rind makes it your best buy in a fibrous lost circulation material.

Strata-Seal®

Strata-Seal has both a plugging and a bridging action. The perlite particles pack tightly in the fractures of the formation. This tight packing strengthens the troublesome formation making it more impermeable, thereby less susceptible to reoccurrence of lost circulation. Can be obtained from drilling mud distributors.

GLC®

GREAT LAKES CARBON CORPORATION—PERLITE DIVISION

P. O. Box 2050

Houston 1, Texas

Notched Plate and Bar Ease Pump Rod Removal

When servicing a slush pump, after the rods have been unscrewed from the crossheads, a simple device can be made to simplify getting the rods and pistons out of the pumps.

A ¾-inch piece of scrap metal is cut to the proper length to cover the opening in the side of the pump. Three slots are cut in the metal plate. Two holes are burned through the plate so that they match up with two threaded holes in the pump housing. After the rods are unscrewed, the strip of metal is bolted in place. A wrecking bar is used against the ends of the rods and leverage is obtained by use of the proper slot. This method can be used on all sizes of pumps.

How-To-Do-It Ideas Earn Money, too!

$10—WORLD OIL editors want how-to-do-it ideas, so your favorite short cut or invention could put money in your pocket! Write down the substance of that latest idea and send it in with a picture or drawing of the installation . . . if accepted, $10 will be yours. Send those money-making ideas today to Hints Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

Wire rope lasts as long as the wire it's made of!

ROEBLING'S NEW ROPE WIRE

1105

HAS THE CAPACITY TO ENDURE...
AND

Royal Blue

WIRE ROPE
IS MADE OF 1105!

Write us for full facts on the all-steel Royal Blue Wire Rope, or contact your Roebling distributor

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, 19 RECTOR ST., NEW YORK 6, N. Y.

Marker on Telephone Pole Indicates Road to Rig

It is difficult and bothersome for a toolpusher or company man to have to spell out directions for getting to each new location. In some areas directions are necessarily vague, and men and trucks can be lost for hours.

The toolpusher of one company, while being shown the direction to a new location, stops at each turn and puts a band around a telephone pole or fence post on the inside of the turn. Then when the truck drivers are moving in the tools, it is necessary only to give them directions to the nearest highway and tell them to turn around each of the bands until they see the stake for the location.

It takes but a few moments to place the bands in position and it saves a lot of time in giving directions, which are vague due to miscalculated distances or vaguely remembered road markers.

KEEP YOUR MUD IN BALANCE

with

"Mud-O-Graf"

- Provides accurate information for uniform mud control.
- Helps prevent blowouts by showing the duration and relative amount of gas in gassy streaks.
- Eliminates guesswork in the use of weighting materials, chemicals, and water.
- Indicates graphically all heavy and light streaks in the circulating system.

The condition of mud in the hole is recorded automatically during every minute of the drilling operations. Weight variations of less than 1/10-pound per gallon can be detected. Mud-O-Graf has been proved in fourteen years tough field service. It eliminates trial and error methods of adding weighting materials. It detects gas or salt water incursions which could cause blowouts.

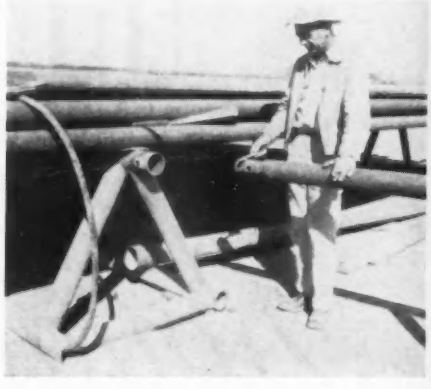
WARREN AUTOMATIC TOOL CO.

Manufacturers of Pit-O-Graf and Rig Runner.

Houston CApitol 4-2511 | Odessa 6-5861 | Lake Charles HEmlock 6-2265 | New Iberia 2-7131 | Harvey FIlimore 1-3721

Hobbs, N. M. 3-8218 | Lafayette 5-5313

Export Representative: International Oil Equipment Co.
30 Rockefeller Plaza, New York City



Standardize Pipe Racks For More Yard Space

One company's toolpusher wanted to place additional pipe racks in the yard to make room for more drill pipe. He made an extension to the racks in the yard, but of the same material and of the same height as the racks used at the rigs when on location. When the pipe is moved to a rig, the rack is thrown on top of the last load and used at the rig to rack additional pipe.

The extension was made by welding one end of the 4½-inch horizontal member onto a single triangular support. A short piece of 3½-inch drill pipe fitted inside of the 4½-inch was welded in place. This horizontal extension was then telescoped into the existing 4½-inch on the rack and holes were burned in the four pipe walls as shown for a ¾-inch locking pin.

This allowed one end of the new rack to rest on the existing support of the old rack and still be easy to move to the field by simply pulling the pin.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

PRODUCTION HINTS

These How-To-Do-It Ideas Can Save You Money

How-To-Do-It Ideas Earn Money, too!

$10—WORLD OIL editors want how-to-do-it ideas, so your favorite short cut or invention could put money in your pocket! Write down the substance of that latest idea and send it in with a picture or drawing of the installation . . . if accepted, $10 will be yours. Send those money-making ideas today to Hints Editor, WORLD OIL, P. O. Box 2608, Houston 1, Texas.

Mount 3 Tanks On Skid to Cut Moving Costs

To combat high transportation costs, one operator unitized and skid-mounted the mud, water and fuel tanks. The skids are not just lengths of pipe welded together, but are welded together to form a manifold for the particular distribution system.

In the photo can be seen one end of a skid with the tank welded on the skid. The skid also is connected into the tank. The cross piece has two 3-inch collars and a ¾-inch collar welded on to it. One 2-inch line is swaged into one collar while the other collar is bull-plugged, but can be used as needed.

This use of the skid mounts for manifolding eliminates connection on the tank that usually are in the way when moving. This method also cuts down on the amount of pipe fitting that must be done when rigging-up.

Install Spring Balancer to Eliminate Lifting Those Heavy Impact Wrenches

A pumping station or any installation using large air driven impact wrenches, will find this suggestion helpful. To eliminate lifting heavy impact wrenches from nut to nut on the cylinder heads of large gas engines, one mechanic installed a simple spring balancer. Using a gate spring of the correct tension, two steel rings and a piece of light metal, he constructed the device shown in the illustration.

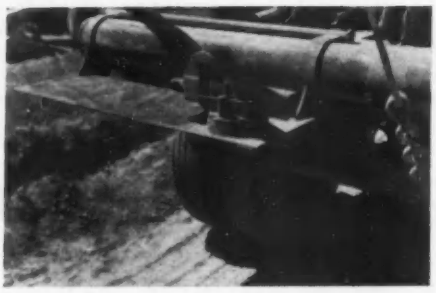
The ring at the top end of the spring is placed over the hook on the chain hoist. The ring at the lower end holds the piece of light metal curved to fit the grip of the wrench. When the wrench is slipped into the metal clip, the job is complete and a slight amount of pressure is all that is necessary to move the wrench from place to place.

Attach All-Steel Bench To Rear of Truck Frame

Frequent need for a small work bench by a truck crew can be met by fitting a sturdy all-steel bench to the rear of an A-frame truck.

Construct the bench of a 12-inch by 39-inch piece of heavy steel sheet and support it with curved strap iron brackets fitted to the round end of the truck bed. The bench can be tilted on to the bed for traveling.

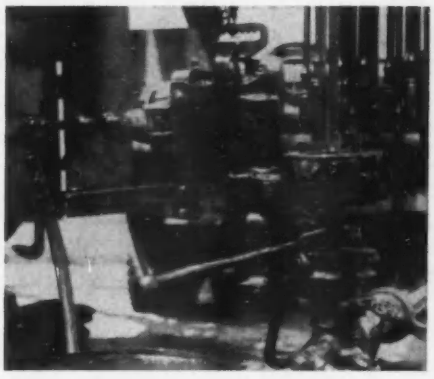
Brackets are hinged by a length of 1-inch steel tubing through which runs a ¾-inch cold roll round steel bar. Steel rings welded to the truck bed anchor the bar end. Bolt the vise to one end of the bench as illustrated.



Sub Wrench for Tongs To Eliminate Bottleneck

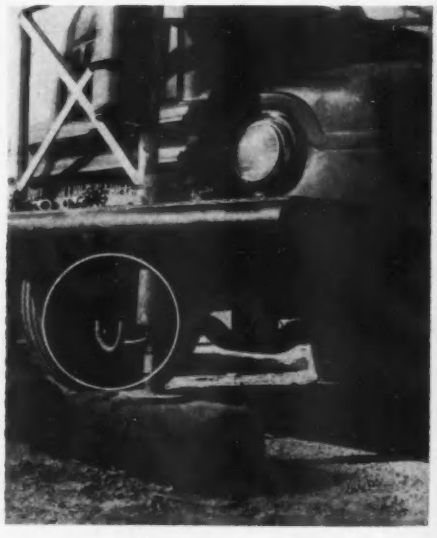
Before sections of sucker rods can be made up or broken both ends of the rods must be engaged in the break-out tongs simultaneously. This results in excessive time and motion as each stand of rods is brought to the surface or run in the hole.

To eliminate this bottleneck, a holding bar and wrench can be substituted for the lower part of the tongs. By using this for a back-up, rods can be quickly broken and joined by applying tongs to one section only.



Here's the NEW
ENARDO 770
VAPO-GARD
THIEF HATCH VALVE
MORE ECONOMICAL THAN ANY OTHER VALVE
Latest in tank valves . . . Single pressure and vacuum gasket insures bottle tight sealing and "De-Icer" action . . . New die-pressed steel construction.
The new Enardo 770 Vapo-Gard features splash guards to keep fluid from spraying on the tank. Also, all thief samples and condensate flow back into tank . . . 45% lighter in weight. For prices or additional information wire, write or phone . . .
770 VAPO-GARD Thief Hatch Valve
Valves furnished either vinyl painted . . . Hot dipped galvanized on basin and cover with base painted . . . Basin and cover in aluminum alloy or entire valve hot-dipped galvanized, except center valve assembly.
ENARDO manufacturing company
BOX 1647 • TULSA, OKLAHOMA

Weld a Tie-Down Handle On Front End of Truck



It sometimes is necessary to tie down the front end of light trailer-mounted rigs and servicing units when working on a well. If proper provisions are not made for this operation, the result usually is time consuming, cumberson and hazardous.

One operator welds a semi-circular piece of ¾-inch rod to the frame of the truck, just the front bumper. An-

Save up to $219 per mile

with new Kaiser Aluminum pipe and couplers!

As you can see in the chart below, *big* savings are possible when you use lightweight Kaiser Aluminum pipe and couplers instead of heavy steel pipe for your drill rig supply lines.

Laying one mile of 4-inch oil rig supply pipe*

Aluminum vs. Steel

	STEEL		ALUMINUM	
OPERATION	MAN HOURS	COST	MAN HOURS	COST
Loading	10.66 @ $2.20	$ 23.46	3.25 @ $2.20	$ 7.15
Stringing (Trucker)	1.66 @ $1.82	3.03	.83 @ $1.82	1.52
(Crew)	3.33 @ $2.20	7.33	1.66 @ $2.20	3.65
Connecting	43.33 @ $2.20	$ 95.33	3.00 @ $2.20	$ 6.60
Disconnecting	26.25 @ $2.20	$ 57.75	5.00 @ $2.20	$11.00
Pick-up and reloading (Trucker)	7.25 @ $1.82	13.20	1.33 @ $1.82	2.42
(Crew)	29.00 @ $2.20	63.80	5.33 @ $2.20	11.73
Total	121.48	$263.90	20.40	$44.07

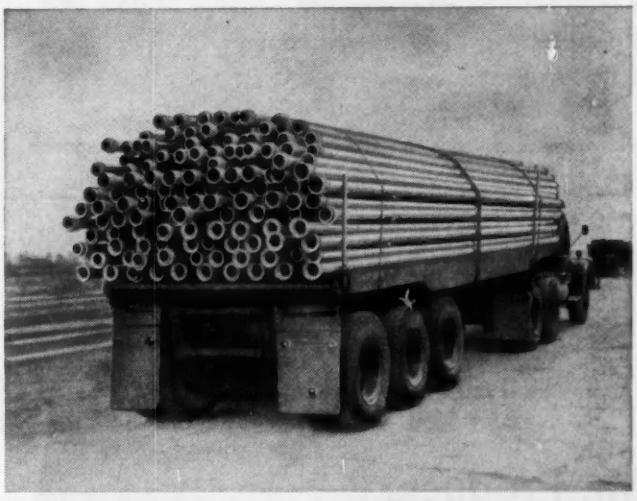
Total savings with Kaiser Aluminum pipe—$219.83!

*Figures compiled from extensive installations by Kaiser Aluminum in Texas. Total savings could be more or slightly less, according to local conditions.

The main reasons for these huge savings are extremely light weight and easy coupling. A 30-foot length of 4-inch Kaiser Aluminum pipe weighs only 31 pounds, while an equivalent length of steel pipe weighs 323 pounds—293 pounds more!

The new quick-connecting aluminum couplers require no welding. One man easily joins pipe sections right in the field with no special equipment. Result: 61½ man-hours saved in disconnecting and connecting time!

Your nearby supplier stocks Kaiser Aluminum petroleum pipe in 30-foot lengths of 2, 3 and 4 inch diameters.



Skidding time reduced from 52 man-hours to only 12½ man-hours by using aluminum pipe instead of heavy steel pipe. One and a half miles of 4" aluminum pipe is an easy load in a truck built to carry steel pipe.

He also has the necessary couplers and fittings to complete your system.

Kaiser Aluminum petroleum pipe is roll-formed and induction welded from high-strength aluminum alloy sheet. Each length is hydrostatically tested at a pressure of 1000 psi. Inside surface is clad with high-purity aluminum to increase resistance to corrosion.

For further information on the pipe and couplers, contact the Kaiser Aluminum sales office listed in your telephone directory.* Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Bldg., Chicago 11, Illinois; *Executive Office,* Kaiser Bldg., Oakland 12, California.

Kaiser Aluminum

setting the pace—in growth, quality and service

Information may also be obtained from the following suppliers:

REPUBLIC SUPPLY COMPANY
Republic Building (Home Office)
Oklahoma City, Oklahoma

DUNIGAN TOOL & SUPPLY COMPANY
1534 South Treadaway (Home Office)
Abilene, Texas

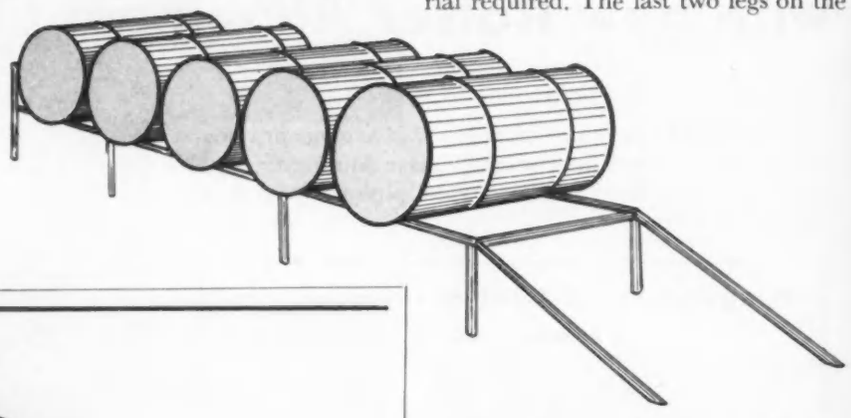
other piece of ¾-inch rod is bent in a circle and welded around the first piece as shown in the photo.

This arrangement provides a ready-made loop for a chain and boomer tie-down without having to have a man crawl under the truck to locate a place on the frame that will support a tie-down.

This feature has also been used when necessary to tow the truck.

Build a Pipe Ramp to Store Drums

A simple pipe rack similar to the one illustrated can make fuel or lube oil drum storage easier and keep the drums in good condition. Scrap pipe, two or three inches in diameter, cut to the proper length is the only material required. The last two legs on the ramp are extended above the horizontal rack as shown to provide a bumper for the drums.



At the other end, two pipes are slanted toward the ground so that the drums can be rolled up or down as required. In this manner, the drums are kept clean and free from corrosion and may be handled easily.

2 of 13 SIZES

Mr. Producer
read this
. . . BEFORE
you buy any
pump jack!

When you pay hard-earned cash for a pump jack you want a piece of equipment that will lift the MOST oil at the LEAST cost for the LONGEST time. This could only mean a JENSEN.

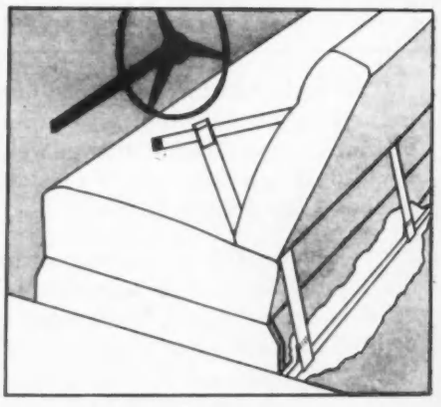
JENSEN JACKS incorporate a functional design proved by 36 years of rugged service in fields around the world. Important mechanical features included in the design are double tapered roller type bearings, precision shaved gears, oil bath lubrication, one-man counterbalance, quick-change gear reduction.

Put your money in a JENSEN JACK, Mr. Producer—get MORE profit from your well.

JENSEN JACKS

JENSEN BROS. MFG. CO., INC.
Coffeyville, Kansas, U.S.A.

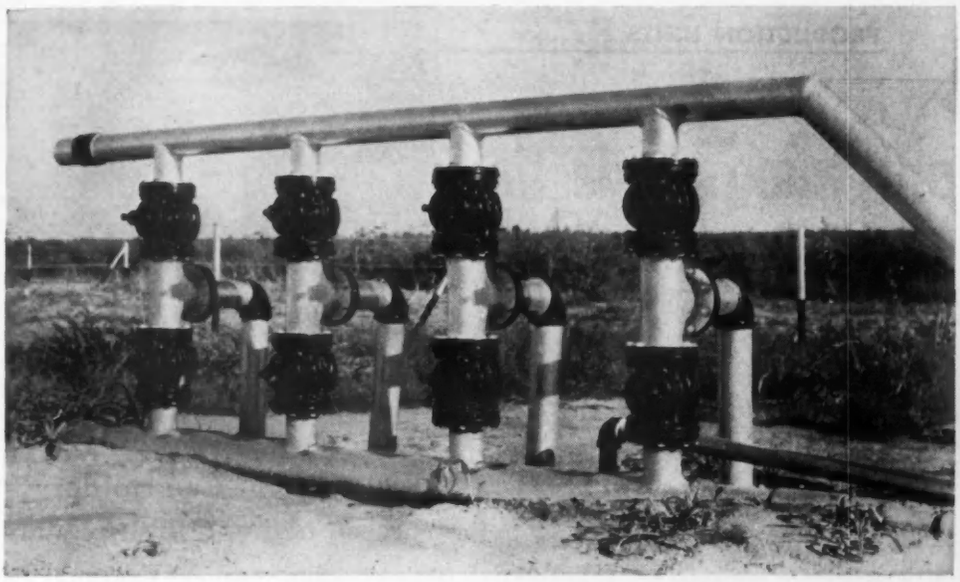
Export Office:
25 Broad Street, New York City



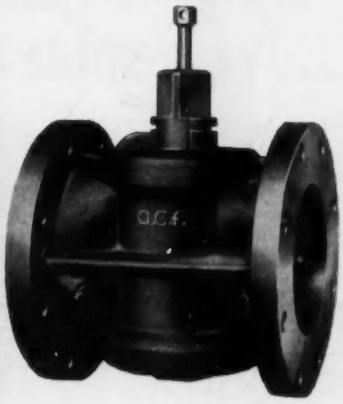
Install Seat Belts for Hazardous Driving

Although the idea is not new, use of safety belts in oil field vehicles cannot be stressed too much. Night driving, bad roads and other hazardous conditions connected with oil field operations make automobile accidents one of the top hazards in the industry.

Literature on the benefits of seat belts can be obtained almost anywhere. Here is one manner in which they may be installed. Pass the belt between the seat and the back rest down through the floor and fasten them to a pipe welded across the car. This type of installation allows two or three sets of belts to be installed in the safest manner possible.



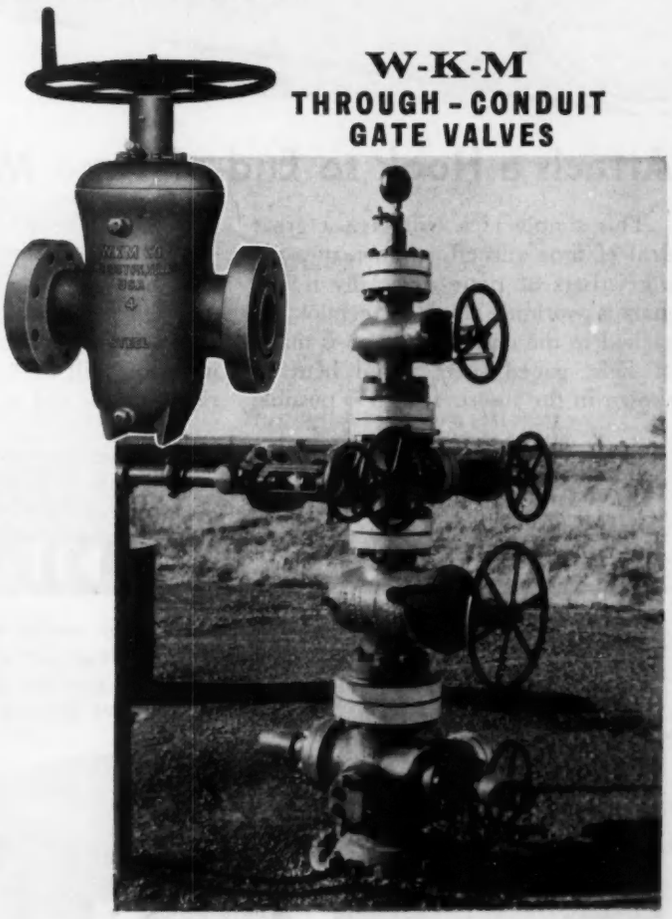
QCf LUBRICATED PLUG VALVES



NOW-

Both High and Low Pressure Valves from W-K-M

W-K-M THROUGH-CONDUIT GATE VALVES



For your Christmas Trees, flow lines, and wherever else high pressures must be safely and positively controlled, there are the famous W-K-M- through-conduit gate valves, in working pressures from 1,000 to 15,000 pounds.

QCf lubricated plug valves, of steel, semi-steel, and special metals, with round or rectangular ports, in working pressures from 200 to 500 pounds — are the perfect companion valves for gathering lines, manifolds, headers, and similar low pressure installations.

Because you need the finest in service wherever valves are required, you will be way ahead when you specify W-K-M or QCf valves for their respective applications.

5605

W-K-M MANUFACTURING COMPANY, INC.

A SUBSIDIARY OF QCf INDUSTRIES INCORPORATED

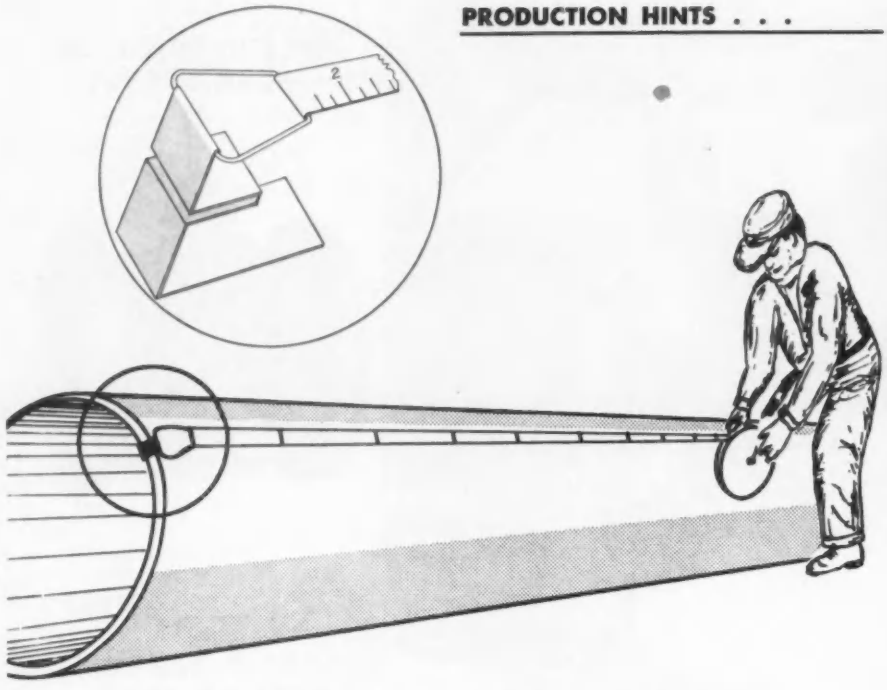
PLANT: MISSOURI CITY, TEXAS • MAILING ADDRESS: P. O. BOX 2117, HOUSTON, TEXAS

MANUFACTURING

W-K-M THROUGH-CONDUIT GATE VALVES

QCf LUBRICATED PLUG VALVES

KEY RETURN BENDS AND FITTINGS



Attach a Hook to End of Tape Measure

This simple idea will save a great deal of time and effort when measuring joints of pipe especially if one man is working alone. The hook attached to the end of the tape is made of light gaged sheet metal bent as shown in the insert. It also is possible to make the hook of heavy gage wire.

This device keeps the end of the tape from slipping off the end of the pipe when measurements are being made. It also assures that the measurements will be taken from the correct point at end of the tape measure.

Build Water Can Holder From Salvaged Brake Drum

A simple holder for the water can may be made from a salvaged brake drum. The installation is made for the running board of a lease truck as demonstrated in the illustration. The drum has just the right taper to wedge the can in place; no other hold-down method is necessary.

The attachment to the running board is made by placing bolts through three of the holes normally used to position the brake drum on the axle. Similar holes through the running board together with nuts and washers complete the tie-down job.

There's a Hercules Split Cone Packing Ring

TAILOR-MADE TO FIT YOUR REQUIREMENTS

Whatever your needs, you'll find a Hercules Split Cone Packing Ring for every pumping condition. They are used exclusively in all Hercules Duplex Polished Rod Stuffing Boxes and they practically eliminate friction. Given proper adjustment and usage they give phenomenal service.

HERCULES SPLIT CONE PACKING RINGS are manufactured in three compositions. Choose Hercules **Hard** Cone Packing for steel polished rods only on wells which pump oil constantly. Use our **Soft** Cone Packing Rings with bronze polished rod liners, or where wells pump intermittently. Select Hercules **Special Lubricated** Cone Packing for adverse conditions where wells pump off for long periods of time.

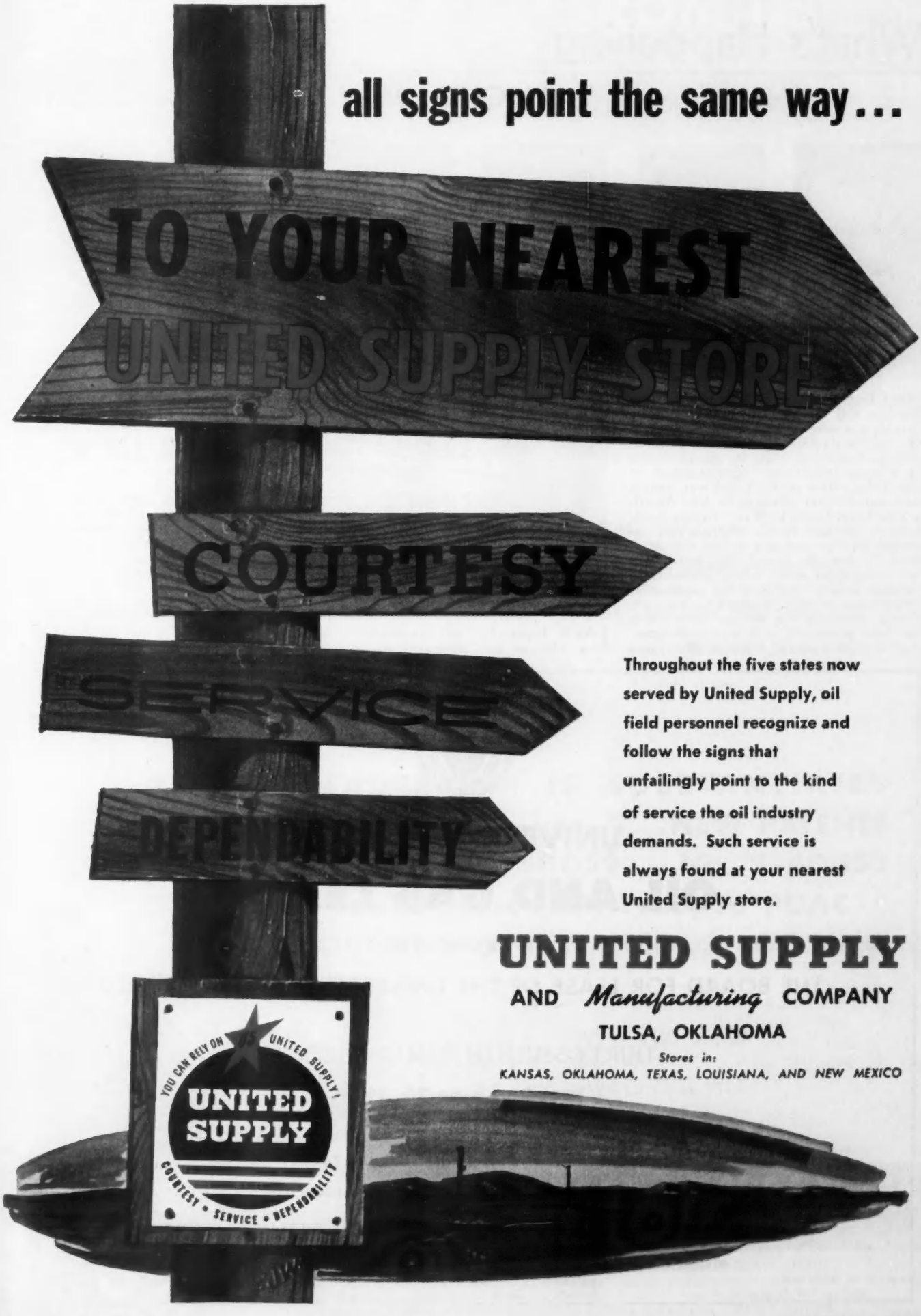
Rings are packed four to a box and are available through your regular supply store.

HERCULES TOOL Company

"MANUFACTURERS OF OIL FIELD EQUIPMENT" SINCE 1924

GENERAL OFFICES AND PLANT TULSA, OKLAHOMA

Export Representative: Oil Field Equipment Co., Inc., 30 Church Street, New York 7, N. Y.



Throughout the five states now served by United Supply, oil field personnel recognize and follow the signs that unfailingly point to the kind of service the oil industry demands. Such service is always found at your nearest United Supply store.

UNITED SUPPLY
AND *Manufacturing* COMPANY
TULSA, OKLAHOMA

Stores in:
KANSAS, OKLAHOMA, TEXAS, LOUISIANA, AND NEW MEXICO

What's Happening

AMONG MEN IN THE INDUSTRY

Floyd Brett

Loren L. Ware

Richard C. Frawley

John B. Etnyre

John K. Lydecker

H. F. Defenbaugh

Floyd Brett, assistant division manager for **Sinclair Oil & Gas Company** at Fort Worth, has been named division manager of the newly-created Midland division. Joining Sinclair in 1929, he was promoted to general production superintendent in the Tulsa office in 1953 and was named assistant division manager in Fort Worth a year later. **Loren L. Ware,** division landman in the Fort Worth office, is now assistant division manager of the new Midland division. He joined Sinclair in 1944 as a geological scout, being promoted to division superintendent of the exploration department in 1954. **Richard C. Frawley,** district landman for Sinclair since 1954, has been promoted to division exploration superintendent of the Midland office; and

Fred C. Rogers

William J. Rogers

John B. Etynre has been transferred from New Orleans and promoted to division geophysicist at Midland. Frawley joined Sinclair in 1933; Etnyre joined the company in 1950 as a geologist. **John K. Lydecker,** former district geologist of the American Republics Corporation, which was acquired by Sinclair in 1955, has been named division geologist for the Midland division; **Herbert F. Defenbaugh** has been promoted to division production superintendent; **Fred C. Rogers** has been transferred to Midland as gas and gas products division superintendent; and **William J. Rogers** has been transferred from Fort Worth to Midland as division petroleum engineer. In the company's Fort Worth division, **Connie L. Wilson,** general staff petroleum engineer, has been appointed assistant division manager, replacing Brett.

UNIVERSITY LANDS

OIL AND GAS LEASES

To Be Offered By

THE BOARD FOR LEASE OF THE UNIVERSITY OF TEXAS LANDS

at

THIRTY-SEVENTH PUBLIC AUCTION

Tuesday, June 26, 1956

Commencing at 10:00 A. M. at the
Commodore Perry Hotel, Austin, Texas

List of leases and additional information obtainable from

UNIVERSITY LANDS—GEOLOGY
P. O. Box 1663
Midland, Texas

BOARD FOR LEASE OF UNIVERSITY LANDS
P. O. Box 7986—University Station
Austin, Texas

"We operators learned about SIMULTANEOUS LOGS the hard way

. . . SO TAKE A TIP FROM US"

NOT Some Logs, in Some Places,
But ALL PGAC LOGS, EVERYWHERE—
ARE SIMULTANEOUS LOGS
. . . and always have been . . . . . .

PGAC developed the Industry's FIRST Simultaneous Logs.

PGAC has used them since 1950—years BEFORE others "introduced" them.

and NOW —

PGAC's LEADERSHIP IS SUBSTANTIATED by the grant of THREE...yes, 3...NEW PATENTS No. 2740051 ... No. 2740052 ... No. 2740053 ..... issued March 27, 1956, to PGAC COVERING SIMULTANEOUS LOGGING

When YOU Log or Perforate Your Well . . . Play It Safe ALWAYS CALL PGAC

PGAC 567

PERFORATING GUNS ATLAS CORPORATION

Houston, Texas Telephone REpublic 4-1651
General Offices and Main Plant: 7730 Scott Street — Sales Office: Melrose Building

P G A C OIL FIELD SERVICES

CALL FOR PROMPT SERVICE — ALWAYS READY TO SERVE YOU

TEXAS: Abilene — Alice — Beaumont — Bowie — Colorado City — Corpus Christi — Dallas — Fort Worth — Gainesville Graham — Houston — Longview — Midland — Odessa — Pampa — Tyler — Victoria — Wichita Falls.
OKLAHOMA: Ardmore — Healdton — Oklahoma City — Pauls Valley — Pawhuska — Perry — Seminole — Tulsa.
LOUISIANA: Houma — Lafayette — Lake Charles — Shreveport. KANSAS: Great Bend — Liberal. NEW MEXICO: Hobbs.

AFFILIATE COMPANIES: CANADA — Perforating Guns of Canada, Ltd.; Edmonton, Alberta
GERMANY — Atlas Deutsch- Amerikanische Olfelddienst G. m. b. H.; Kiel VENEZUELA — Servicios Tecnicos Atlas, C.A., Caracas

It takes a lot of courage and a lot of money for Joe Roughneck to drill the oil wells necessary to supply ever-increasing demands. Despite fabulous stories . . about 7 out of 8 are dry holes.

But Joe, spirit of the oil industry, keeps drilling . . keeps bringing in wells . . to satisfy needs of the public, of industry and the Free World's defense. Lone Star Steel . . Joe's Friend . . is proud to supply the API pipe required by his stepped up drilling schedules.

Lone Star . . most modern pipe plant in the oil area . . turns out API quality casing, tubing and line pipe day and night for Joe's special needs.

Neighbor, wherever you are, specify Lone Star . . and we both get a good deal.

Lone Star STEEL COMPANY

LSS

EXECUTIVE-SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas

DISTRICT SALES OFFICES
Houston, Texas | Midland, Texas | San Antonio, Texas
Tulsa, Oklahoma | Wichita Falls, Texas | Shreveport, La.

Wilson joined Sinclair as division engineer in 1951. **Marc H. Lowrance,** district landman for Sinclair at Oklahoma City since 1952, has been promoted to division exploration superintendent in Fort Worth.

•

The Texas Company recently announced the election of **Claud B. Barrett** as a director. A vice president for the company at Houston, he formerly was vice president in charge of domestic sales. Barrett joined Texaco as a salesman in Atlanta in 1927. In 1938 he was named manager of the Southern territory at Houston; in 1953 he was elected vice president in charge of domestic sales with headquarters in New York. He became vice president at Houston in 1955.

Claud B. Barrett

•

Kerr-McGee Oil Industries, Inc., has announced the election of **L. A. Woodward** as administrative vice president of the company. Woodward was formerly president of Mid-West Refineries, Inc., of Grand Rapids, Mich.

•

Dr. Frederic H. Lahee, former geological and research counselor for Sun Oil Company, opened a consulting office in Dallas May 1. A 37-year Sun veteran, Dr. Lahee joined the firm in 1918. He served as chief geologist from 1920 to 1947 when he was named to the counsel post he held until his retirement in September, 1955. He taught geology at Harvard and at Massachusetts Institute of Technology, and has been a member of the Committee on Crude Oil Reserves of the American Petroleum Institute since its formation in 1936. In 1953 he was awarded the Sidney Powers Memorial Medal, highest honor in petroleum geology, presented by the American Association of Petroleum Geologists.

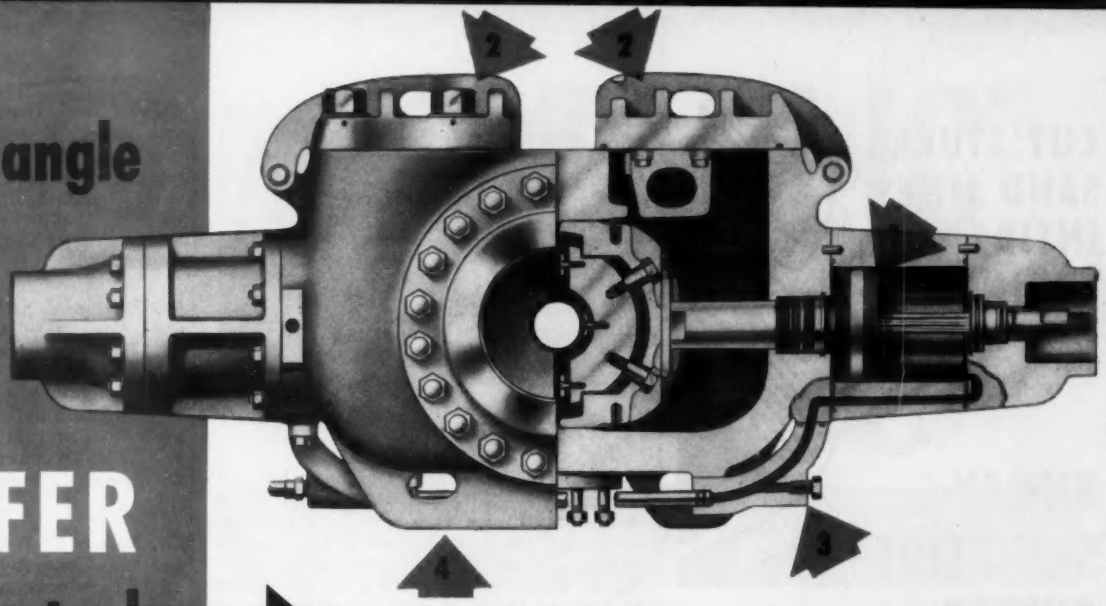
Frederic H. Lahee

•

Standard Oil Company (Indiana) recently announced the appointment of four assistant regional accounting managers. **B. J. Yarrington** was promoted to senior assistant regional accounting manager in the Eastern region with headquarters at Detroit. He was formerly assistant regional accounting manager. **J. A. Bullard,** assistant office manager at Grand Rapids, Mich., was named assistant regional accounting manager for the eastern region, **A. R. Heiserman,** assistant office manager at Evansville, Ind., was appointed assistant regional accounting manager for the southeastern region at Indianapolis, and **F. C. Shockley,** office manager at La Crosse, Wis., succeeds **E. E. Wittmond** at St. Louis, Mo., as assistant regional accounting manager in the southern region. Wittmond is retiring after almost 40 years' service with the company.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Another angle on SHAFFER Cellar Control Gate Features



1 Note the *Single* hydraulic piston by which each ram is actuated. Not only is this piston *directly behind* the ram for maximum operating efficiency, but one-piston-per-ram means:

a. Fewer and simpler operating parts.
b. Fewer hydraulic seals to maintain.
c. Simpler manifolding of hydraulic lines.
d. Easier servicing when necessary.
e. More-favorable ratio of piston area to piston circumferential seal — therefore less internal friction plus increased efficiency.

2 Note how the patented doors through which the rams are serviced open along the *side* of the gate where there is plenty of room. There is no need to expand critical *end* dimensions of the gate for servicing the rams — nor is it necessary to allow extra space *above* the gate. Since end and height dimensions are the most critical ones in governing cellar requirements, Shaffer's basic advantages here are of paramount importance!

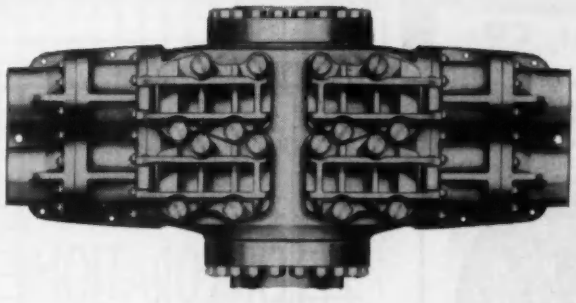
3 Note how all manifold connections are compactly unitized on one side of the gate. Connections are quick and easy to make — equally easy to service.

4 Note the sturdy integral ribs upon which the gate "slides" for easy loading, unloading and storage. This feature also protects against damage to studs, lines and other parts.

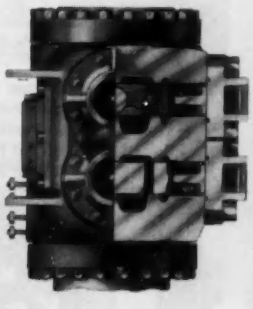
TOP VIEW *emphasizes* BASIC DESIGN ADVANTAGES

You have probably seen the Shaffer Hydraulic Cellar Control Gate from the side view many times before. But to get a better idea of the really important advantages found in Shaffer Hydraulic Gates, take a close look at this *top* view...

FRONT VIEW



END VIEW



No matter how you look at Shaffer Gates — from the front, top or ends — you'll find them unsurpassed in basic engineering advancements. Let your nearest Shaffer representative give you the complete story. Or write direct!

A free copy of the latest Shaffer Catalog will gladly be sent on request!

Shaffer products are described in the latest Composite Catalog.

33 years OF OIL TOOL LEADERSHIP

SHAFFER

HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops: Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Acme Oil Tool Company, 1801 S. E. 29th Street
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 546
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 1788
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

CUT STUCK SAND LINES INSIDE TUBING

KINLEY SAND LINE CUTTER

M. M. Kinley Company, Licensees

ABILENE, TEXAS
Hudson-Eads, Inc. ----------2-5331
CORPUS CHRISTI
Tubokut Wireline Services----------5-1811
HOBBS
Horne Well Service Co.----------3-5396
MIDLAND
Luccous Service & Equipment Co.-------2-1631
PETTUS, TEXAS
Eddie Jones Engineering Co.-16 or Beeville 1547
OKLAHOMA CITY
Rainbo Service Co.----ME 4-2131, ME 2-3045
LIBERAL, KANSAS
Rainbo Service ----------Main 4-3598
WICHITA FALLS
Hudson-Eads, Inc. ---2-3767, 2-8584, 3-4690
CASPER, WYOMING
C. A. White----------3-5264
GLENDIVE, MONTANA
C. A. White----------EMpire 5-3833
FORT MORGAN, COLO.
C. A. White----------919

24 HOUR SERVICE

ACME OIL TOOL CO.

- Competent Operators
- Rotary Fishing Tool Service
- Spang Cable Tools • Drill Pipe
- Blow Out Preventers • Rentals
- Complete Oil Field Machine Shop

for Servco Keyseat Wipers call ACME

Oklahoma City MElrose 7-2426
Healdton, Okla. Phone 155
WICHITA FALLS FISHING TOOL CO. 3-1437
GREAT BEND FISHING TOOL CO. Great Bend 7819
Borger, Texas Broadway 3-5031
Liberal, Kansas Main 4-3222
ACME-METEX TOOL CO. Hobbs, N. M. EXpress 3-2171

GOING FISHING? ACME CALL YOUR FRIEND!

Morgan J. Davis

Ed J. Hamner

Humble Oil & Refining Company has announced the election of **Morgan J. Davis** as executive vice president to assist the president, **Hines H. Baker**, in the general administration of the company's affairs. **Ed J. Hamner** was elected to the board to succeed Davis as director in charge of exploration and **Dick H. Gregg**, member of Humble's legal staff since 1938, was made associate general counsel. Davis has been a vice president of Humble since 1951 and a director since 1948. He joined Humble as a geologist in 1925 after graduating from The University of Texas. Except for a period spent in the East Indies, he has been with the company since that time, serving as a senior geologist, division geologist, chief geologist and manager of the Exploration department. Hamner has been with Humble since 1932. After two years in production work, he moved into the Exploration department. From 1948 until 1955 he was manager of Humble operations in California and since 1955 has been assistant manager of the Exploration department in Houston.

•

M. E. Witherspoon, formerly assistant to the vice president at Sinton, Texas, has been transferred to Midland and promoted to regional supervisor in charge of all activities in West Texas and eastern New Mexico for **Plymouth Oil Company**. He was employed originally at Texon by the Big Lake Oil Company, a Plymouth subsidiary, in 1927. He transferred to Sinton with Plymouth Oil in 1935 and served in various capacities prior to his appointment as assistant to the vice president in 1954.

•

W. A. Daniel, assistant division petroleum engineer in the Oklahoma City division office of **Magnolia Petroleum Company's** Producing division, has been transferred to the company's general offices in Dallas in a promotional change. In his new post, he will be section chief in charge of fluid injection (secondary recovery) and hydrology.

•

Dr. Robert E. Wilson, chairman of **Standard Oil Company (Indiana)**, was named as 1956 winner of engineering's foremost honor, the Washington Award, sponsored by five engineering societies. Dr. Wilson was selected by his fellow engineers for unusual dedication of leadership, through science and engineering, to the advancement of research, industry, education and public affairs. The award was founded in 1916 by John W. Alvord, a civil engineer, so that an outstanding engineer could be recognized by fellow engineers. The Award Commission represents the American Society of Civil Engineers, American Institute of Electrical Engineers, American Institute of Mining and Metallurgical Engineers, and American Society of Mechanical Engineers. It is administered by the Western Society of Engineers.

•

C. T. Stout, who joined **Blackwell Oil & Gas Company** in 1923 and was made a director in 1951, has been elected a vice president of the company. He replaces **A. B. Imel** who retires as vice president but remains as director of the company and a consultant. Stout is in charge of land operations.

TAYLOR EXPLORATION COMPANY INC

Reflection Seismograph Surveys

Geophysical Review & Consulting

Electric & Gamma Ray Logging

Bulldozers & Air Compressors

Core Drilling to 2500 Feet

HOUSTON, TEX.
2118 WELCH
JA 9-3876

Brewster-Bartle Drilling Company, Inc., recently announced the election of **John Domercq, Jr.,** as executive vice president of the firm. He will be concerned primarily with the expanding offshore operations and will headquarter in Houston. Prior to joining Brewster-Bartle, Domercq was vice president and director of Standard Oil Company of Texas in Houston and most recently in a similar capacity with the California Company in New Orleans.

John Domercq

•

K. E. Beall, vice president, Economics department of **Phillips Petroleum Company,** was advanced May 1 to the newly-created position of vice president and petroleum consultant, reporting to the executive staff. **C. E. Turner** was named manager of the Economics department. Beall joined Phillips as an engineer in the Production department in 1920, transferred to the Economics department in 1925, became manager in 1946, and has been vice president in charge of the department since 1948. Turner, manager of the department's reservoir division until his new promotion, started with the company in 1933 in the construction division of the Production department. In 1938 he was transferred to the Economics department to organize its reservoir division and serve as manager. In two supervisory changes being made in Phillips' Northwest Production division, **W. M. Schul,** district superintendent of the Cut Bank, Mont., district, is being promoted to division superintendent at Denver, and **W. L. Kitsman,** presently assistant division superintendent of the Western division, is being advanced to district superintendent at Cut Bank, replacing Schul. Schul joined Phillips' Production department in 1920, later serving as district chief clerk, lease foreman, well service superintendent, and district superintendent. In 1955 he was made division superintendent in Cut Bank. Kitsman, who joined Phillips in 1936, subsequently worked in supervisory capacities in the Wichita division, eastern Kansas district and Western region before being made assistant superintendent of the Western division in 1955.

•

Bart De Laat and Associates, petroleum consultants, have moved their offices to the Bank of the Southwest building in Houston.

•

Henry Carter Rea, petroleum consultant of Denver, recently returned from a trip to India where he studied the political and economic climate with reference to American investments for development of the Indian oil industry. He is familiar with the area's general potential oil areas, having lived and worked in India before World War II. Rea's offices in Denver are in the C. A. Johnson building.

•

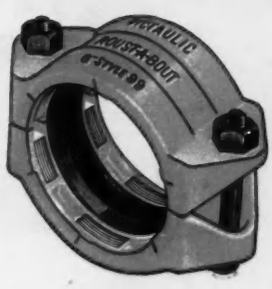
Morris C. Minton, geologist, has opened a consulting office in the Milam building, San Antonio, Texas. He formerly was South Texas district geologist for Great Lakes Carbon Corporation.

VICTAULIC®

METHOD OF PIPING

VICTAULIC HAS EVERYTHING...

VICTAULIC COUPLINGS
Simple, fast, reliable. *Styles 77, 77-D,* for standard uses with steel or spiral pipe, — *Style 75* for light duty. Other styles for cast iron, plastic and other pipes. Sizes ¾" to 60".



ROUST-A-BOUT COUPLINGS
For plain or beveled end pipe *Style 99.* Simple, quick, and strong. Best engineered and most useful plain end coupling made — takes a real "bull-dog" grip on the pipe. Sizes 2" to 8".

VICTAULIC SNAP-JOINTS
The new, boltless, speed coupling, *Style 78.* Hinged into one assembly for fast piping hook-up or disassembly. Hand locks for savings in time and money. Ideal for portable lines. Sizes 1" to 8".

COUPLINGS FOR EVERY PIPING JOB

VICTAULIC FULL-FLOW FITTINGS
Elbows, Tees, Reducers, Laterals, *a complete line*—fit all Victaulic Couplings. Easily installed — top efficiency. Sizes ¾" to 12".

VIC-GROOVER TOOLS
Time saving, on-the-job grooving tools. Light weight, easy to handle — operate manually or from any power drive. Sizes ¾" to 8".

PLUS FITTINGS AND GROOVING TOOLS

"EASIEST WAY TO MAKE ENDS MEET"

Promptly available from distributor stocks coast to coast.
Write for NEW Victaulic Catalog-Manual No. 55

VICTAULIC COMPANY OF AMERICA
P. O. BOX 509 • Elizabeth, N. J.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Marion C. Lawton has retired from the oil business after serving more than 30 years with **Shell Oil Company.** Lawton, who started his oil career as a mechanics helper for Shell in 1924, later served as gas absorption plant operator and gas plant and water plant engineer. At the time of his retirement he was an assistant operator in the gas department of Shell's San Joaquin division at Bakersfield.

•

Barber Oil Corporation announces the election of **T. Rieber** to the newly-created office of chairman of the board. Vice President **James H. Durbin** succeeds Rieber as president. Rieber will continue as chief executive officer of the corporation and Durbin will direct and coordinate operations and administration. Durbin was a director and officer of American Republics Corporation for many years and was executive vice president when it was dissolved in 1955. Since then he has been a director and vice president of Barber.

•

George J. Gregor, manager of **Socony Mobil Oil Company's** Lakes division at Buffalo, N. Y., has been named assistant to **Guy L. Tate,** director and vice president in charge of marketing for Magnolia Petroleum Company. Magnolia is the Southwestern affiliate of Socony Mobil. Gregor joined Socony Mobil in 1922 as a mail clerk. He progressed through positions of bookkeeper, credit clerk, district credit manager, general salesman, and Buffalo district manager before being appointed Lakes division manager 13 years ago.

LET'S TALK IT OVER
TEXAS NATIONAL BANK
An understanding of oil production with a genuine desire to serve producers
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION
TEXAS National BANK
OF HOUSTON

H. W. Brown

Merrill W. Haas

H. W. Brown has resigned as a director of The Carter Oil Company to become the representative for Europe and Africa on the New York staff of the coordinator of producing activities, **Standard Oil Company (New Jersey). Merrill W. Haas,** exploration manager, was elected a member of the Carter board. He will continue as exploration manager. Brown has been a Carter director since 1954. In 1928 he worked as seismograph operator for Humble Oil & Refining Company and in 1935 joined Carter as seismograph party chief. He became assistant chief geophysicist in the Tulsa office in 1949 and served as chief geophysicist from 1952 until he was made exploration manager in 1953. While making trips throughout Europe and Africa to become acquainted with his new assignment, Brown will headquarter in Rome. He will return early in 1957 to the Jersey producing coordinator's office in New York where he will be associated with **M. A. Wright,** former Carter executive vice president and now producing coordinator for Jersey Standard. Haas' first job following college in 1933 was as paleontologist with Humble at Houston. In 1934 he became district geologist for Lago Petroleum Corporation at LaSalina, Venezuela, joining Standard Oil Company of Venezuela three years later. In 1941 he was division geologist of Creole Petroleum Corporation; in 1949 was on the exploration staff of Standard of New Jersey; and in 1950 joined Carter as staff geologist. He was named exploration manager in 1954.

•

Reserve Oil and Gas Company has announced the following appointments: **Douglas C. Alexander,** treasurer, has been named vice president; **Henry T. Fair, Jr.,** assistant secretary and assistant treasurer, has been named treasurer and assistant secretary; and **Robert E. Aberley,** chief accountant, has been named assistant treasurer.

•

I. H. Hughes was named a vice president of **Sunray Mid-Continent Oil Company** at a recent meeting of the company's board of directors. He will serve as assistant to Sunray Mid-Continent President W. C. Whaley and will continue to serve also as secretary to the company's salary policy committee. Hughes joined the company in 1954 as assistant to the vice president of production for Mid-Continent Petroleum Corporation. Upon the merger of that company with Sunray in 1955, he retained this position with the new Sunray Mid-Continent Oil Company until he was named to handle the company's salary policy and new job training program. He has held various executive positions with other major oil companies in the U. S. and spent several years in Peru and Colombia directing South America operations for International Petroleum Company, Ltd.

Unit Rig U-1220* Drawworks

The Model U-1220 was developed specifically for deep drilling. It meets all requirements for extreme depths, portability and endurance—regardless of location.

The rig shown above drilling in the open Gulf is equipped with a Unit Rig Model U-1220 drawworks, and a 3-engine rig drive. The drilling barge tender carries 3 Emsco D-700 slush pumps, powered through an LS1420 Unit Rig 3-engine, 3-pump drive compound by 3 PTDS-8 Superior diesel engines.

All major drilling equipment was furnished by Mid-Continent Supply Company.

*** Indicates 1200-2000 input horsepower.**

- Adjusting linkage and exposed hardware protected against corrosion by special plating.
- Sectional construction facilitates transportation.
- Six hoisting and three rotary speeds.
- Two 42-inch YC 1200 Fawick Vestorque clutches on drum shaft.
- Parkersburg hydromatic brake or Dynamatic brake on extended drum shaft.
- 32¼" x 57" drum, with 80" x 10" water circulating brake rims.
- Casing reel package, friction clutch controlled, optional.
- As an electric rig—drawworks can be furnished with friction or jaw clutches.

M-C56-2

EXCLUSIVE EXPORT DISTRIBUTORS
Export Division 45 Rockefeller Plaza New York, N. Y.

MID-CONTINENT Supply Company
MID-CONTINENT BLDG. • FORT WORTH, TEXAS

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

We challenge you

to find better

PROTECTIVE CLOTHING!

Toughest by Test FROG BRAND®

illustrated above: ¾ length coat

Sawyer

For every industry where personnel protection and safety are vital, *only* Sawyer Neoprene Latex Clothing offers *all* these advantages:

- 100% protection against oils, chemicals, alkalies, abrasion — and other hazards!
- "Exclusive Coating Process" . . . (for years and years of extra wear and durability) — *original* with Sawyer!
- guaranteed not to peel, blister or crack in ordinary usage!
- double interlocked sewn seams that *can't* come apart!
- solid brass or non-conductive fastenings that *can't* rip off or corrode!
- designed for roomy, action-free comfort!

Sawyer clothing also Rubberized or Oiled. Full range of jackets, pants, coats, hats, aprons for *more* efficiency, *more* economy, *more* protection on *every* job!

Make us prove it!

Send for complete details and price list.

The H. M. Sawyer & Son Company

A Division of Sawyer-Tower, Inc.

specialists in Protective Clothing for more than a century

7 Thorndike St., Cambridge 41, Mass.

Unitization Committee Meets

Seeligson operators-producers signed working interest agreements to pool oil and gas production in the large multi-zone field in south Texas at a recent meeting in Dallas. Purpose of unitization is to maintain pressure and to effect maximum recovery and conservation by hydrocarbon reserves. Members of the Seeligson Operators Unitization Committee attending were (front row, left to right) A. F. Hamilton, Renwar Oil Corporation; J. F. Conley, Magnolia Petroleum Company; H. H. Phillips, Jr., Dunlap Oil Corporation; R. E. Ross, Sunray Mid-Continent Oil Company; W. N. Kellogg, Sunray Mid-Continent; F. E. Heath, Sun Oil Company; and Floyd C. Ramsey, Ramsey Interests. Back row, left to right, are B. L. Ryan, Shell Oil Company; O. K. Holman, Texas Gulf; F. H. Rhees, Sinclair Oil & Gas Company; and J. A. Scecina, Richardson & McCarrick. Sun Oil will operate all properties when the unit is established; Magnolia Petroleum will serve as plant operator.

A. L. Saulsbury has been promoted to drilling superintendent for the Southern division, **General Petroleum Corporation.** A 40-year veteran with General Petroleum, he first was employed by the company as a rig builder in 1916. Before his new appointment, Saulsbury was senior drilling foreman at the company's Vernon facility.

•

Edward W. Pallas, traffic analyst, recently became the twenty-sixth employe to complete 50 years of service in the 67-year history of **Standard Oil Company (Indiana).** He will retire June 16. As a 14-year-old boy, Pallas began working for the company in 1906 stuffing envelopes with promotion circulars; four months later he became an office boy under Edward G. Seubert, then chief clerk of the Manufacturing department and a later president of Standard Oil. In 1913 Pallas transferred to the company traffic department where he has worked ever since.

•

Gordon L. Kneeland, an accountant for **Shell Oil Company,** has retired after 30 years' service. Beginning as a clerk in Wilmington, Calif., in 1926, he later transferred to the Los Angeles office and was an accountant in the area treasury department at the time of his retirement.

DESIGNED, TESTED AND PROVEN IN THE OIL FIELDS

Screened Air Port

Unexcelled . . . for Outdoor Use

- DRIP PROOF
- VERMIN PROOF
- MOISTURE PROOF
- CORROSION RESISTANT
- FORCED AIR COOLED

All these features of Fieldmaster Ball Bearing Motors have been designed to overcome the rugged conditions of Oil Field requirements.

CHECK THESE OUTSTANDING ADVANTAGES.

Heavy Cast base for alignment, stability, heavy duty, double-shielded, prelubricated bearings, reduces lubrication worries, high grade silicon steel in the magnetic circuit reduces iron losses . . . Wide variety of windings provides triple ratings, dual voltages . . . high torque licks heavy starting problems. High slip is available to take care of reciprocating load requirements encountered in pumping.

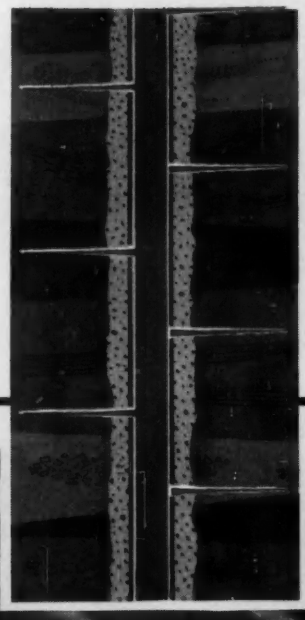
FIELDMASTER

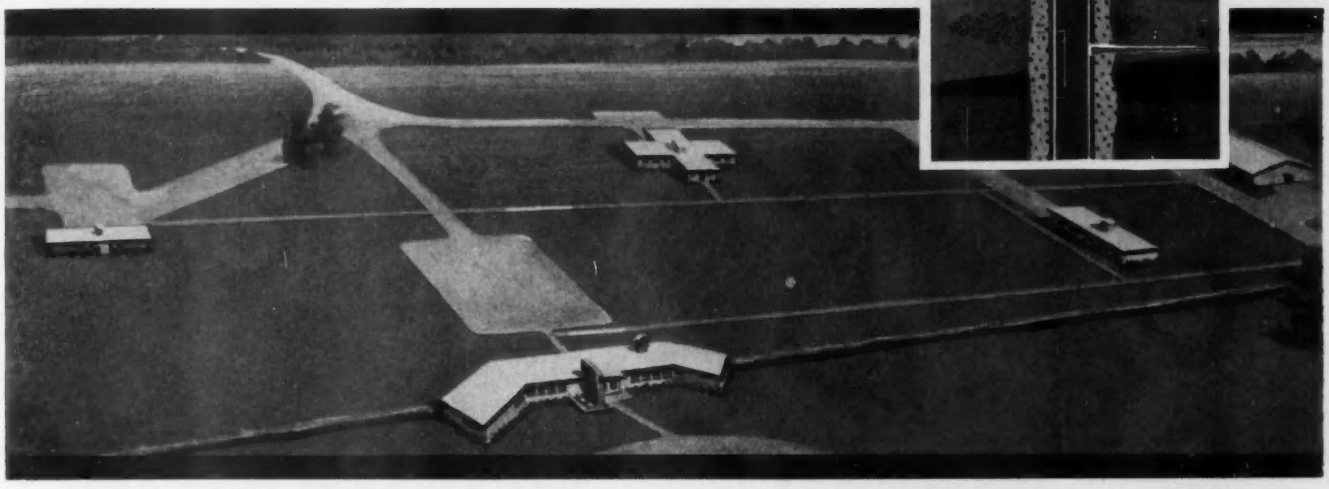
Write For Descriptive Literature.

BETHLEHEM SUPPLY CO. TULSA, OKLAHOMA

Manufactured by VALLEY ELECTRIC CORPORATION, St. Louis, 8, Mo.

Announcing the Opening of World Headquarters for Jet Perforating Research





Located on a 200-acre site near Arlington, Texas (between Fort Worth and Dallas) and providing facilities for research, testing, and manufacturing of jet shaped charges.

JET RESEARCH CENTER, INC.

Blake M. Caldwell
President

R. L. Robinson
Manager, Research Dept.

Now in operation near Arlington is the most modern and complete industrial facility for jet shaped charge research and development. It is Jet Research Center, Inc., world headquarters for jet perforating research.

Jet Research Center has been created to serve all licensees and users of the jet shaped charge. Its purpose is easily defined . . . *greater perforating power through research.*

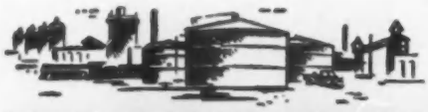
Utilizing the experience and knowledge of men who are specialists in this modern method of perforating, Jet Research Center will combine basic research with practical manufacturing techniques . . . will produce new and more potent jet charges for industry and government. Jet Research Center will also continue to finance fundamental research at the Poulter Laboratories of Stanford Research Institute.

Look to Jet Research Center for new knowledge leading to greater performance in perforating!

Nearly 3 Million Jet Charges Were Used For Well Perforating Last Year!

JRC

JET RESEARCH CENTER, INC.
P. O. Box 246, Arlington, Texas
Phone CR 5-2864



Use SAFETY
GRIP-STRUT
grating

Wherever a safe footing is required

Grip-Strut circular stairway on Shell Oil tank in Portland, Ore.

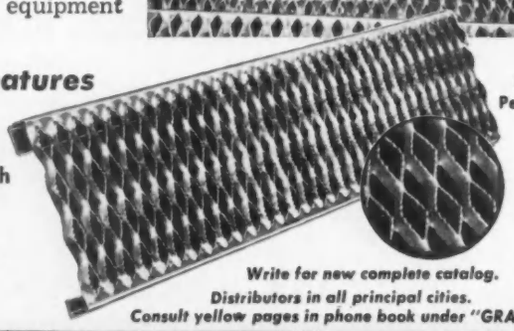
See how Shell Oil uses Grip-Strut for a safe ramp between tanks.

View looking down circular stairway on Shell Oil tank shown above.

SAFETY GRIP-STRUT is the new basic material, all in one piece (including channels), not welded, riveted or expanded in steel or aluminum, in standard sizes and gauges. Safety GRIP-STRUT presents an open space, in a diamond pattern, in excess of 55% of the area for ready access of light and air and gives a positive NON-SKID footing in all directions. Ideal for work platforms, stair and ladder steps, flooring, balconies, catwalks, machinery guards, fire escapes and for original equipment safety treads.

Important Safety Features

- ★ Fire proof
- ★ Slip proof
- ★ Maximum strength
- ★ Minimum weight
- ★ Easy to stand on
- ★ Cool in summer—warm in winter



Pat. Pending

Write for new complete catalog.
Distributors in all principal cities.
Consult yellow pages in phone book under "GRATING"

GRIP-STRUT division
THE GLOBE COMPANY • *Manufacturers since 1914*
4008 S. PRINCETON AVE. • CHICAGO 9, ILL.

P. H. Bohart

S. G. Sanderson

Gulf Oil Corporation has announced that **P. H. Bohart,** vice president, production, at Tulsa, was transferred to Pittsburgh as vice president, planning and economics, May 1. He also will be chairman of the Economics Review Council, reporting directly to the president and the executive vice president in connection with his corporation-wide responsibilities for conducting studies necessary to the forward planning of The Gulf Companies. Bohart joined Gulf as a geologist in 1919, later serving with Mexican Gulf Oil Company, Gypsy Oil Company and Gulf Pipe Line Company of Oklahoma. He made a special survey of operations of Kuwait Oil Company Limited in 1947, and was appointed vice president in charge of Tulsa Production division in 1950. **S. G. Sanderson,** manager of production for the Tulsa division since 1952, has been appointed Bohart's successor as division manager of the Tulsa Production division. He first was employed by Gulf in the Natural Gas department in 1913. Appointed general superintendent of production for the Gypsy Oil Company in 1929, he worked in this capacity until 1952 when he was made manager of production for the Tulsa division.

•

Union Oil Company of California recently approved an increase in board membership from 16 to 18, electing as the two additional members, **Dudley Tower,** vice president for production, and **K. E. Kingman,** vice president for manufacturing. All previous board members were reelected.

•

George H. Gustafson's appointment as treasurer and general auditor for the **Livingston Oil Company** of Tulsa has been announced. Before joining the Livingston firm, Gustafson worked in private accounting for various industrial firms in New York. In 1939 he became a partner in the firm of E. Earle Tomblins and Company in Tulsa.

George H. Gustafson

•

Merle Blakely's appointment as regional public relations advisor for **The Carter Oil Company** has been announced, his assignment including work with all Carter manufacturing, marketing, exploration and producing operations in the Rocky Mountain area. Blakely joined Carter as public relations assistant in 1944 and became assistant manager of the department in 1950. A former newspaperman, he has worked on newspapers in Okmulgee, Muskogee, Tulsa, Oklahoma City and Houston.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

DEATHS

John Logan Hazzard, 70, one of the first oil drillers in the Kern River field in California, died recently in Oildale. He took part in the great oil boom in the county around 1910.

Dewey Ricker, 58, one of the men who had an active part in oil field development work on the West Coast, died recently in Bakersfield, Calif. Beginning in the California oil business when just a boy building rigs for Standard Oil Company during the early part of the century, he later became a driller for Standard at Huntington Beach and joined C. J. Berry in drilling the first wildcat well in the Hovey Hills west of Taft. In 1923 he was credited with drilling the then deepest well in the world in the Taft area.

John F. (Pat) Paterson, 45, former manager of production for Husky Oil & Refining Ltd., Calgary, Alberta, Canada, died April 9 in Cody, Wyo. With the Husky Oil Company subsidiary since 1947, he previously had been with Phillips Petroleum Company. He had worked in the petroleum industry in the U. S., Venezuela and Canada 22 years.

James M. Garwood, Sr., 48, office manager and assistant secretary-treasurer of Reading and Bates, Inc., oil firm, and three affiliated companies, died April 12.

Alvin Richards, 65, Tulsa oil company attorney, died April 8. He had been with The Pure Oil Company since 1918, serving as general counsel for the Southwestern Producing division prior to his retirement January 1 of this year.

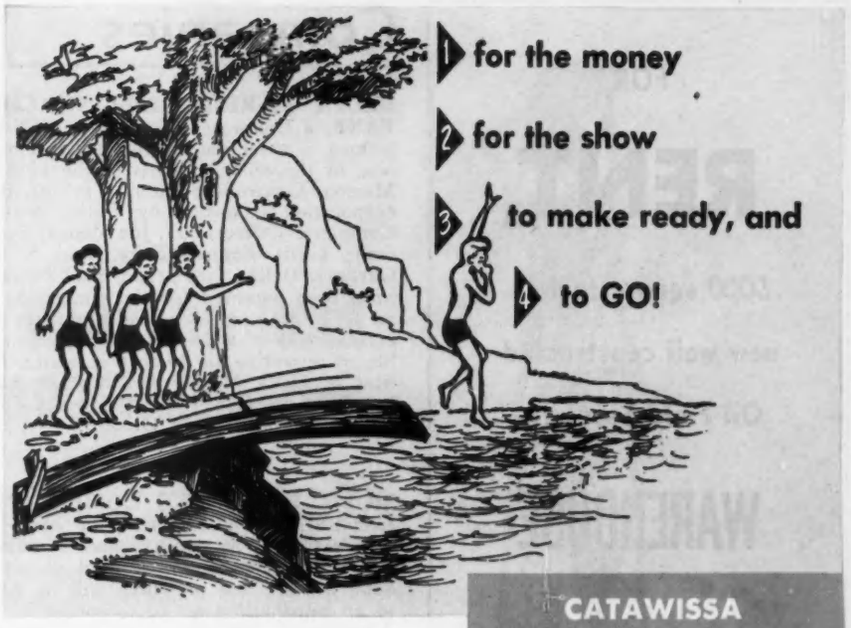
Will J. Reid, 66, California oil executive, died April 8. President of the Hancock Oil Company from its inception in 1922 until 1953 and chairman of the board for the last three years, he also was an organizer of the Long Beach Oil Development Company which was formed in 1939 to develop the Long Beach tidelands.

Robert H. Wood, 69, president of Broswood Oil Company and nationally known geologist, died April 3 in Tulsa. In 1919, after working with the United States Geological Survey, he started in the oil business as a consulting geologist, later forming a partnership with his brother. In 1924 they formed the Broswood Oil Company.

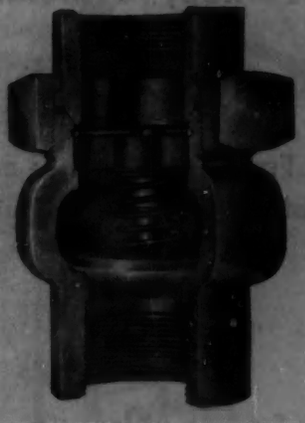
George S. Rhodes, 78, died March 20 in Tallahassee, Fla. A retired district production superintendent of Carter Oil Company, he had been with the company 35 years.

John J. (Jack) Conry, 77, former president of Carter Oil Company, died March 3. He had been in retirement since 1942.

Ernest McDaniel, Sr., 80, active in the lease and royalty business in Texas, Oklahoma and New Mexico since 1920, died February 28 in New Mexico. He was with Royalties Management Corporation of Tulsa at the time of his death. Prior to his oil activities, McDaniel had been a pioneer newspaper editor in eastern Oklahoma.



CATAWISSA
400-M
SPRING CONTROLLED
CHECK VALVE



THE CHECK VALVE WITH THE
PERFECT SEAL
UNION CONNECTION

1 **Compare the price tag**
of a Catawissa 400-M Spring Controlled Check Valve against any check valve of its kind on the market!

2 **Consider the appearance**
of Catawissa 400-M Check Valves. Precision machining of contour steel castings and forgings makes the big difference!

3 **Ease and speed of application**
make Catawissa 400-M Check Valves ideal for jobs where valuable space is wasted on the full union and nipple necessary to install the conventional type check valve!

4 **Observe the heavy wall sections**
of the nickel semi-steel body and forged steel coupling nut, where strength counts!

Gives Positive Seating, Eliminates Vibration or Hammering
in vertical or horizontal use

☆

All Applications
including mild, common acids; non-oxidizing alkalies; hydro-carbons and ammonia.

☆

Sizes 1" thru 3"

You can forget your check valve problems when you install Catawissa 400-M Spring Controlled Check Valves! They're built to last indefinitely with Catawissa's exclusive 3-to-1 Safety Factor, the extra value feature of all Catawissa products . . . your assurance of trouble-free service.

These valves are more easily accessible than any other type spring controlled check valve on the market. The single union connection may be broken and working parts removed for repairs or inspection without removing the valve from the line.

• AT YOUR FAVORITE SUPPLY STORE •
CATAWISSA VALVE AND FITTINGS COMPANY
CATAWISSA, PENNA.

FOR

RENT

5000 square feet in

new well constructed

Oil Field Specialty

WAREHOUSE

at

Venice, Louisiana

24 hour service

Space to suit tenant.

From 70 to 80 barge and offshore rigs now operating out of Venice.

•

For further information call

JOHN SIDES
6539 Vicksburg Street
NEW ORLEANS, LA.
Phone GALvez-2601

or

W. F. STONE
844 Esperson Building
HOUSTON, TEXAS
Phone CA-2-0208

•

JOHN SIDES
Pipe Rental Company

rental of 3½" and 2⅞" drill pipe

Companies

DELTA MARINE DRILLING COMPANY, a Delaware corporation, has been formed to enter the drilling contract business in the offshore areas of the Gulf of Mexico. Controlling interest in the new corporation is owned by Delta Drilling Company. Officers are **Joe Zeppa**, president; **Chris Zeppa**, Tyler, and **J. M. Gardner**, Dallas, vice presidents. Contracts have been awarded for the conversion of an LST into a drilling tender and for the construction of a submersible barge capable of operating in 30 feet of water. Offices of Delta Marine Drilling Company have been opened in The California Company building in New Orleans.

•

MOBIL PRODUCING COMPANY has established a new scholarship in petroleum engineering at Montana School of Mines. The scholarship carries a total award of $800 a year, half of which will be given to an outstanding senior majoring in the department, and the other half to the Department of Petroleum Engineering to be used for educational purposes. The student will be selected by the department on basis of character, scholarship, ability and potential leadership. Mobil Producing Company, with headquarters in Billings, is a subsidiary of Socony Mobil Oil Company and is a leading exploration company and oil producer in Montana and other parts of the Rocky Mountains. Officers of Mobil Producing Company have served on the petroleum advisory committees of the School of Mines and of its affiliate, the Montana Bureau of Mines and Geology.

•

GREAT BASIN PETROLEUM COMPANY will more than triple production, reserves and cash flow, and greatly expand operations throughout the Middle West, Rocky Mountain area and California through acquisition of two oil and gas producing companies and a well service firm. The appraised value of the combined company's assets will be in excess of $10 million. At a special meeting recently, the board of directors of Great Basin approved the acquisition, through an exchange of stock, of Lincoln Oil, Gas and Refining Company of Denver, Lincoln Petroleum Company of Los Angeles, and the Brown Well Service of West Texas, Odessa. Directors of both Lincoln Oil, Gas and Refining Company and Brown Well Service have approved the transaction. Lincoln Petroleum's acquisition is pending stockholder approval. New officers and directors of Great Basin Petroleum will be **R. G. Greene**, president and director; **William E. Morgan**, executive vice president and director; **Thomas W. Evans**, chairman of the board and director; and **C. C. Brown**, president of Brown Well and director. Greene and Morgan will be in charge of the company's operation.

•

PRODUCING PROPERTIES, INC. recently bought 15 wells formerly owned by Witco Oil and Gas Company, wholly-owned subsidiary of Witco Chemical Company. The properties are located in Moore, Hutchinson and Carson counties of Texas, and Rio Arriba County, New Mexico. Purchase price was approximately $1.7 million.

This OPENING and CLOSING motion....

LUBRICATES
your plug valves
AUTOMATICALLY
when you equip with....

DELTA
AUTOMATIC
PLUG VALVE LUBRICATOR

Engineers agree that plug valves should be lubricated each time they are opened and closed.

NOW they can be—automatically—by the adaption of this simple, fool-proof device, that never forgets.

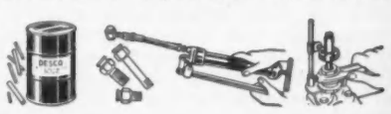
Each time the valve is opened and closed a measured amount of lubricant is forced in. The reservoir holds enough lubricant for the valve to be opened 50 to 80 times, and is refilled in seconds with the Delta Gun.

The savings in time, trouble and valves will repay the small cost of this Delta Lubricator again and again. Write for details and prices.

The Only Complete Plug Valve Lubrication Company

DELTA ENGINEERING SALES CO.
539 Aero Drive **Shreveport, La.**
Sales Offices in All Principal Cities

DELTA-DESCO
PLUG VALVE LUBRICANTS AND EQUIPMENT



LUBRICANTS FITTINGS GUNS LUBRICATORS

LOWER COST PER FOOT OF HOLE with a FAILING 2500 Holemaster®

SPEEDIER OPERATION — Simplified, streamline design makes the 2500 Holemaster the master of faster rig-up, extreme portability. The 2500 Holemaster is designed for deep exploration and slim hole production drilling to depths of 5000 feet. When you're operating with a 2500 Holemaster, you're on location and ready to make hole far, far faster.

EASIER OPERATION — Finger-tip air controls, air clutches and hydraulic drives make 2500 Holemaster operation simple and easy. Controls are grouped, fewer in number, give smoother performance. Slush pump, drawworks and rotary table may be driven by one engine or both or complete drill unit may be driven by both engines compounded. You get far, far more effective drilling.

TROUBLE-FREE OPERATION — The Failing 2500 Holemaster delivers consistently better performance with a minimum of downtime. Durability and longer life are built-in through better engineering design, better quality materials, greater precision construction. Failing field men keep in touch with all Failing equipment — a Failing rig is never left "orphan" without parts and service support.

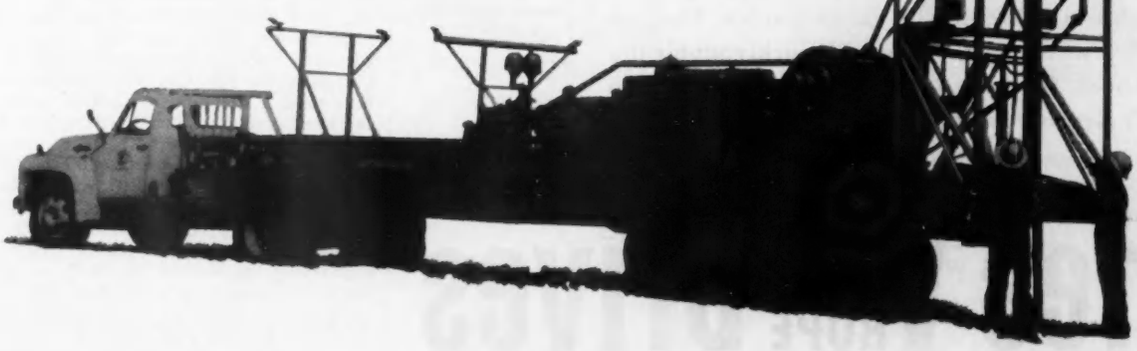
Sum up these big 2500 Holemaster advantages. They total up to lower cost per foot of hole drilled — more profitable operation for you.

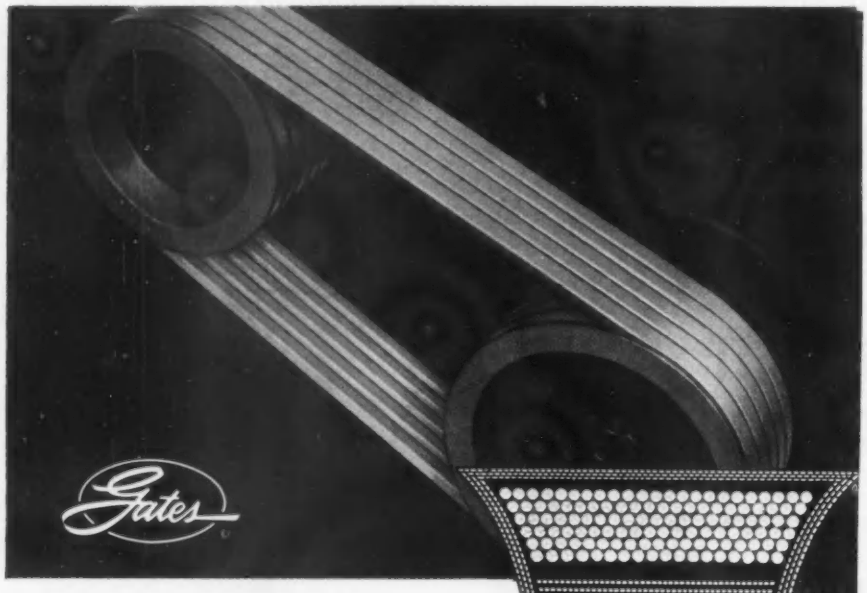
GEORGE E. Failing COMPANY

A Subsidiary of WESTINGHOUSE AIR BRAKE COMPANY

ENID, OKLAHOMA, U.S.A.

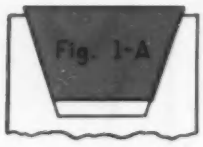
SPECIAL FEATURES — 4-way tapered sectional mast, 90,000 lb. capacity — All steel rotary table, 18" opening (10" optional) — Hydraulic power takeoff on each engine — Duplex 5½" by 8" reciprocating slush pump — Patented floating gear box — Two air compressors — Helical-gear 4 speed transmission with reverse — Double-drum, air operated drawworks.





Concave sides make V-belts last longer

The sides of every Gates V-belt (Fig. 1) are concave—a precisely engineered curve that greatly increases V-belt life. Here's why:



On the bend around the sheave, the concave sides of a Gates V-belt fill out and become straight (Fig. 1-A). Thus the belt makes full contact with the sides of the sheave, grips the sheave evenly, and wear is distributed evenly across the sides of the belt. Uniform wear lengthens belt life; keeps costs down.

Make this simple test

Take a straight-sided belt (Fig. 2) and bend it. Feel the sides at the bend; they bulge out. Now picture this bulge in the sheave groove (Fig. 2-A). It is easy to see that the belt makes uneven contact at points indicated by arrows. Naturally, wear is greater at these points. Uneven wear shortens belt life; increases belt costs.

Cut down-time and V-belt replacement costs. Specify belts that grip evenly and wear longer . . . specify Gates Vulco Rope—the V-belt with concave sides. There is a Gates distributor nearby who will quickly supply the belts you need. The Gates Rubber Co., Denver, Colorado

—World's Largest Maker of V-Belts

TPA 66

Gates VULCO ROPE Drives

SIBONEY DEVELOPMENT AND EXPLORATION COMPANY stockholders recently approved a change in name to Siboney-Caribbean Petroleum Company. The new name will more closely identify the business purpose and the area in which the company expects to carry on its operation. Siboney's stock is listed on the American Stock Exchange, and trading under the new name began April 4.

•

DAVID H. RANKIN & CO., a general securities business recently formed in Fort Worth, Texas, by David H. Rankin, independent oil operator, will specialize in oil and gas and associated issues. The firm will continue activity in the oil and gas business, also, consulting in oil, gas and drilling financing.

•

READING & BATES OFFSHORE DRILLING COMPANY, recently organized in Tulsa, will conduct offshore drilling operations in the Gulf for the CATC group of oil companies. **J. W. (Jack) Bates, Jr.**, president of Reading & Bates, Inc., and vice president of Reading & Bates Drilling Co., Ltd., of Canada, is president of the new company. **C. E. Thornton**, Calgary, Alberta, Canada, president of the Canadian company, is vice president; and **J. W. Bates, Sr.**, Tulsa, is secretary and treasurer of all three companies. The new drilling firm has contracted for the construction and equipping of two drilling tenders at a cost of $2.5 million each.

•

MAGNOLIA PETROLUEM COMPANY's Petroleum Engineering Laboratory, located near Dallas, is now in full operation. Using test equipment in the new building, engineers and other laboratory personnel will check rock samples removed from reservoirs to determine nature of the oil sands. They will measure ratios between oil and gas in the sands, how the sand would react to water-flooding, the viscosity of oil at the same temperatures as in the reservoir, and gather other information employed by Magnolia in evaluating new crude sources and making best use of older fields. The new building is grouped with other company laboratories on Duncanville Road, 15 miles south of downtown Dallas. It replaces older facilities near the same site. Under maximum conditions, the new test center will run analyses on hundreds of samples per month, all from Magnolia's oil producing properties in the Southwest and Midwest. Supervisor of the laboratory is **Phillip O. Wroten** of Dallas; his assistant is **S. D. Procter, Jr.**

•

CONTINENTAL OIL COMPANY has established a Gulf of Mexico exploration division, with headquarters in Houston. The new division is responsible for Conoco exploratory operations in the Gulf of Mexico, except those conducted by the company for the CATC Offshore Group. Key men in the division, all of whom will be headquartered in Houston, are **C. E. Greenwood**, assistant to the southern regional geologist, promoted to division geologist, Gulf of Mexico division; **L. Ray Tucker**, landman, promoted to Gulf of Mexico division land superintendent; **C. H. Gullick**, southwestern region geophysical supervisor, promoted to Gulf of Mexico division geophysicist; and **Sam M. Udden**, geologist, promoted to assistant division geologist for the new division.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

THE TROUBLE WITH TROUBLE...

you can't scare it away!

SOME PEOPLE in distant lands rely upon masks and rites to scare away misfortune.

But American businessmen know from experience that the best protection for their interests overseas is strong, reliable insurance through the American Foreign Insurance Association.

That's because AFIA's experts are skilled in fitting fire, marine, casualty and surety insurance to the needs of business—and to the conditions prevailing where the foreign risk is located.

This knowledge of sound underwriting with world-wide service through more than 600 foreign offices makes AFIA an outstanding choice of America's business leaders.

Ask your Insurance Agent or Broker to consult AFIA on your foreign insurance problems.

COURTESY AMERICAN MUSEUM OF NATURAL HISTORY

AFIA

AMERICAN FOREIGN INSURANCE ASSOCIATION

161 William Street • New York 38, New York

CHICAGO OFFICE . Insurance Exchange Building, 175 West Jackson Blvd., Chicago 4, Illinois
DALLAS OFFICE . . . . . Mercantile Bank Building, 106 So. Ervay Street, Dallas 1, Texas
LOS ANGELES OFFICE . . . . . 3277 Wilshire Boulevard, Los Angeles 5, California
SAN FRANCISCO OFFICE . Russ Building, 235 Montgomery Street, San Francisco 4, California
WASHINGTON OFFICE . . Woodward Building, 733 15th Street, N.W., Washington 5, D.C.

What's Happening

AMONG INDUSTRY ASSOCIATIONS

Houston Nomads Honor Visitors

J. B. O'Connor (front row, center), executive vice president of Dresser Industries, told of his experiences in Russia and of the Hydro-Drill acquired there at a recent Nomads meeting in Houston. Guests attending included (left to right, standing) G. H. Ratcliffe, Shell Company of Venezuela; W. B. Thomas, A-Z Export Company, S. A., Maracaibo, Venezuela; C. Hayden Dye, A-Z Export, Anaco, Venezuela; and Willard Johnson, Magnet Cove Barium Corporation, Houston. Seated are Thomas E. McDowell and Preston Dillon, Petroleum Overseas Consultants, Houston.

Rocky Mountain Geologists Plan Fall Field Trip

Southeastern Colorado will be the center of activity during the fall field trip scheduled by the Rocky Mountain Association of Geologists September 26-28. Emphasis will be on The Wet Mountains, Huerfano Park, Raton Basin, Sangre de Cristo Mountains, Apishapa Uplift, Sierra Grande Uplift and Purgatoire River Canyon.

Papers and lectures will cover general geology of the area and points of interest on uranium and petroleum exploration.

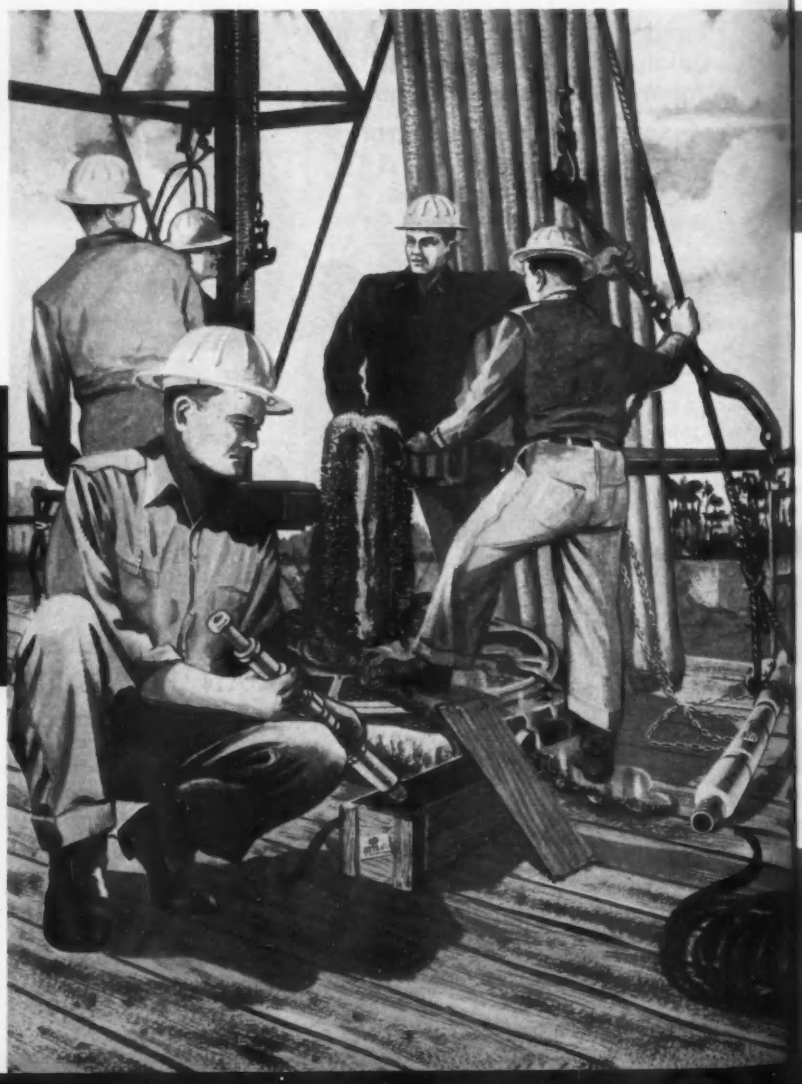
Reservations can be made through Lou Perry, Pure Oil Company, Denver.

NACE Section Issues Corrosion Tour Report

The Permian Basin Section of the National Association of Corrosion Engineers has issued a detailed report of their sixth biennial corrosion tour. The report gives descriptive history of each exhibit, current findings and complete discussions. Exhibits cover corrosion problems in pipe lines, tanks and treaters, surface equipment, water systems and refineries in the Permian Basin.

Copies of the report, which are $3 each, can be ordered from Roscoe Jarman, secretary, P. O. Box 2049, Odessa, Texas.

Otis..."First in Pressure Control"



Fire Protection Association Schedules June Convention

All aspects of fire prevention and fire protection will be discussed by 33 speakers in a series of 12 sessions during the sixtieth annual meeting of the National Fire Protection Association in Boston June 4-8. Discussions will cover recent fire safety developments in aviation, industry, construction, automation, research, education, flammable liquids and gases, and in city and rural fire fighting techniques.

The international fire safety group, founded in 1896, is source of most of the nation's fire protection standards, suggested ordinances and codes. At the 1956 meeting, NFPA membership will act officially on more than 30 new and revised fire safety standards including those relating to building construction, extinguishers and extinguishing systems, flammable liquids and flammable gases, forest fires, explosion prevention and fire-fighting equipment.

More than 1500 persons from North America and abroad are expected to attend the week-long conference.

Cable Tool Operators Affiliate with OIPA

The recently-organized Cable Tool Operators Association has become a permanent cable tool operators committee of the Oklahoma Independent Petroleum Association. George F. Martin, Tulsa oil operator, is active chairman of the group.

The new OIPA committee will headquarter in Tulsa. The state group has offices in Oklahoma City.

Four Oklahoma and Texas oil men received the American Petroleum Institute's "Citation for Service" award at the Mid-Continent district meeting of the API's Division of Production in acknowledgment of outstanding individual service to the industry. Awards were presented by A. W. Thompson, center, API vice president for production. Receiving the awards, left to right, are John E. Eckel, The Carter Oil Company; Howard G. Texter, Spang-Chalfant Division of National Supply Company; George Berlin, Skelly Oil Company; and Clayton Husted, Clayton Husted, Contractors.

F. F. Wright to Head API Mid-Continent District

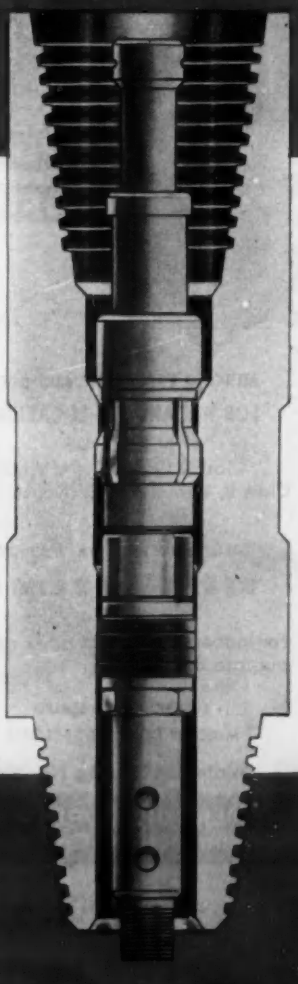
F. F. Wright, Sinclair Oil and Gas Company, Tulsa, was elected district chairman of the Mid-Continent district of the American Petroleum Institute's Division of Production during the recent three-day meeting in Wichita, Kansas, that attracted nearly 1000 oil men from Kansas, Oklahoma and Texas.

District vice-chairman elected were E. E. Young, Sohio Petroleum Company, for the Seminole-Oklahoma City area; Weldon Butler, Carter Oil Company, for Kansas; Fred Morton, Glenn Gillespie and Sons, for the Drumright-Perry area; Martin F. Ludeman, West Pampa Repressuring Association, for the Texas Panhandle; Carl Bentley, Mack Oil Company, for southwestern Oklahoma; and E. W. Hughes, Sohio, for the Golden Trend area.

W. J. Bovaird, Bovaird Supply Company, Tulsa, was elected secretary-treasurer for the district.

Wright succeeds Jack Tarner, Phillips Petroleum Company, Bartlesville, Okla., as district chairman. Tarner will serve in the position of chairman of the advisory committee for the district.

NEW OTIS DRILL PIPE PLUG



A Quick, Safe Means of Plugging Drill Pipe If A Well Starts To Unload During Drilling or Workovers

Don't risk a blow-out . . . have an Otis Removable Plug and Drill Pipe Nipple on hand in case of an emergency. If there is a possibility that the well might unload as pipe is being run, the nipple can be installed in the string near the bottom with the plug in place to allow circulation only through the drill stem. The nipple may also be run in as part of the string when pipe is tripped, and, if the well comes in, a gate valve can be stabbed onto the joint at the surface, and the plug pumped down into the nipple. Or the nipple and the gate valve can be stabbed onto the joint in the rotary, the plug pumped in, the gate valve removed, and the string run to bottom. The plug can be retrieved on a wire line, under pressure, as desired.

This new choke and nipple assembly is another Otis tool that affords exclusive applications not available in any other equipment on the market. We will be glad to give you additional details and illustrated literature without obligation if you will contact your nearest Otis office.

OTIS PRESSURE CONTROL, INC.

Do the controls you specify carry these listings?

MERCOID PRESSURE AND TEMPERATURE CONTROLS

MERCOID TYPES DAE AND DSE
FOR HAZARDOUS LOCATIONS
N.E. CODE
Class I, Group D (NEMA 7)
Class II, Group E, F, G (NEMA 9, 9A)

ALSO
MERCOID TYPES DA AND DS
GENERAL PURPOSE
NEMA 1,
For indoor service and other general purpose applications

EQUIPPED WITH SEALED MERCURY CONTACT SWITCHES

Write For Catalog No. 856

THE MERCOID CORPORATION
4211 Belmont Ave., Chicago 41, Ill.

Herrmann Succeeds King As TIPRO President

A. E. Herrmann of Amarillo was elected president of the Texas Independent Producers and Royalty Owners Association at the organization's tenth annual meeting in Dallas. He succeeds retiring president A. P. King, Jr., of Houston, who was cited for his outstanding work in 1955 during the recent meeting.

In addition to officers, executive committee members and directors were elected for each district of Texas. G. Scott Hammonds of Dallas was reelected secretary, and Vance Foster, vice president in charge of the oil department for the First National Bank of Dallas, was elected treasurer.

Foster succeeded William T. Beard, Jr., vice president of the Alamo National Bank of San Antonio, who has served in the post eight years.

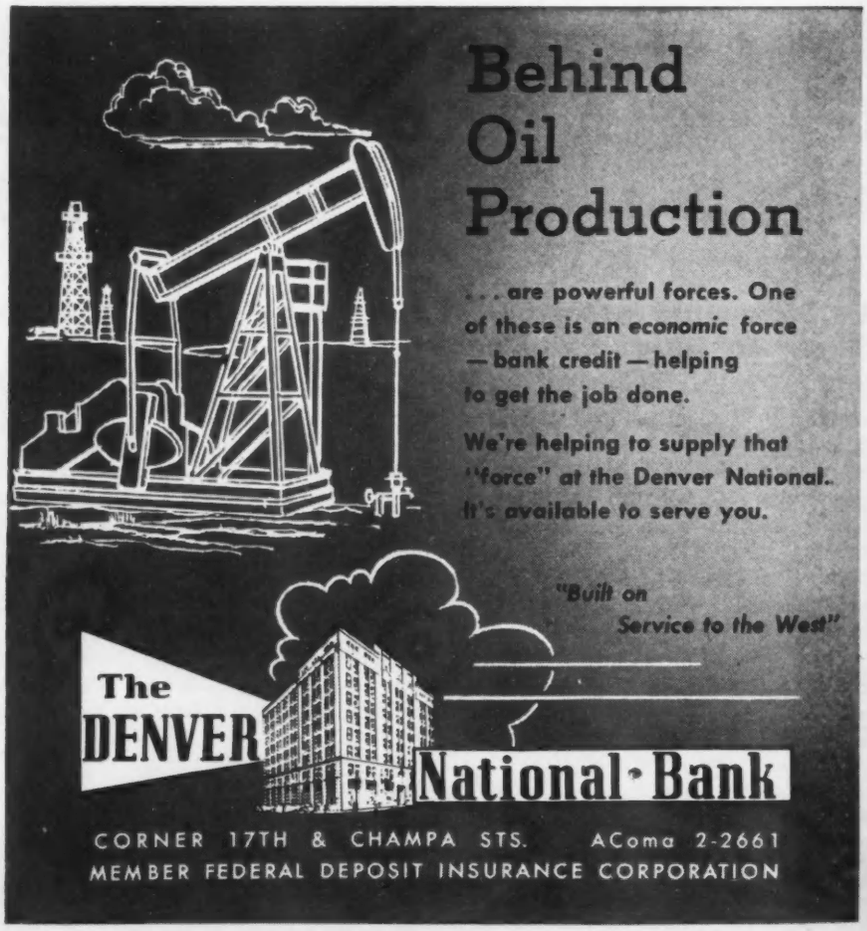
Herrmann, president of the A. E. Herrmann Corporation, was one of the organizers of TIPRO and is a former member of the executive committee of the association. He has been active in Texas oil circles since 1921. Formerly operating in the Breckenridge area, he moved to the Panhandle in 1925. His firm operates oil and gas wells in five Panhandle counties.

Herrmann participated in the founding of both the Panhandle Producers and Royalty Owners Association and the Independent Petroleum Association of America. He is a past president of the former group and has served on the executive committee of the IPAA.

At the recent TIPRO meeting in Dallas, R. E. (Bob) Smith (left), who was chief of the Roughneck's Club in 1955, announced the winner of the award for 1956. He is Jake L. Hamon (right) of Dallas, the first independent operator to serve as chairman of the American Petroleum Institute's board of directors.

Indiana Oil and Gas Group Names 1956-57 Officers

J. R. Atkinson, Inland Producers, will head the Indiana Oil and Gas Association as president for the coming year. John B. Buchman, independent operator, has been elected first vice president; Tom Egan, independent, second vice president; and E. J. Reading, Sun Oil Company, secretary-treasurer. All are of Evansville.


Behind Oil Production
. . . are powerful forces. One of these is an economic force — bank credit — helping to get the job done.
We're helping to supply that "force" at the Denver National. It's available to serve you.
"Built on Service to the West"
The DENVER National Bank
CORNER 17TH & CHAMPA STS. AComa 2-2661
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

D & S diamonds drill deeper, faster!

The world's ever spiralling need for oil and gas is causing deeper and deeper drilling. What's more, there are more than twice as many wells being drilled today as there were twenty years ago.

D&S Truco diamond drilling bits are making tremendous contributions in deeper drilling because of their faster penetration and efficient operation in hard strata . . . resulting in extraordinary savings in time and dollars.

WRITE OR CALL TODAY! D&S engineer-salesmen will analyse equipment, formation, depth, and operating techniques . . . and explain our custom-service and equipment. Real D&S advantages for you!

Drilling & Service

ULTRA FINE DIAMOND EQUIPMENT FOR THE OILFIELD
6210 NORTH CENTRAL EXPRESSWAY | DALLAS, TEXAS
OFFICES IN ALL PRINCIPAL OIL AREAS

TRUCO DIAMOND BITS

DIAMOND CORING BITS
Fast penetration, full core recovery.

DIAMOND DRILLING BITS
More footage, less rig time.

DIAMOND WASHOVER SHOES
Fast "Fish" recovery.

CORE BARRELS
— The standard of the industry.

New Books, Maps and Movies

LOGS AND INDEX MAP OF SOUTHWEST LOUISIANA, The Lafayette Geological Society, Oil Center Station, Lafayette, La. $45 per set; $1 index map alone.

Thirty type logs of southwest Louisiana with foraminiferal markers have been compiled and published by The Lafayette Geological Society. The scale of one inch equals 100 feet is used. The western half of the index base map of South Louisiana, included in the set, is divided into 30 type areas. It is printed on 22-inch by 40-inch paper on a scale of one inch equals eight miles.

•

STRATIGRAPHY OF THE MIOCENE, The Lafayette Geological Society, Oil Center Station, Lafayette, La. $2.50.

An isometric block diagram of South Louisiana showing stratigraphy of the Miocene has been published by The Lafayette Geological Society, with a summary of the faunal zones used as key markers. Printed on 20-inch by 44-inch paper, the map is on scale of one inch equals eight miles.

•

SUMMARY SECONDARY RECOVERY OPERATIONS IN KANSAS DURING 1954, Interstate Oil Compact Commission, P. O. Box 3127, Oklahoma City 5.

Prepared by the Kansas Secondary Recovery Committee, this publication is a reprint from Bulletin 112 of the State Geological Survey of Kansas, and contains a table listing 172 secondary recovery projects in operation in Kansas during 1954. Total production was slightly more than 10 million barrels. A map of eastern Kansas is included, showing location of secondary recovery projects.

•

PEOPLE AND PETROLEUM, Creole Petroleum Corporation, Movies U. S. A. Inc., 729 7th Avenue, New York City.

Creole Petroleum Corporation's new documentary film shows drilling, maintenance and pipe line operations in Lake Maracaibo and exploration for new fields in the interior of Venezuela. The 27-minute black and white film emphasizes Creole's cooperation with the Venezuelan government with higher domestic living standards the objective. It is available for general distribution in 16-millimeter size. Movies U.S.A. Inc. is distributor.

•

IRA RINEHART'S 1956 YEARBOOK, Rinehart Oil News Company, Dallas.

Following the same editorial format as previous editions, the new double-volume reference work contains complete 30-acre coverage of last year's major discoveries, important extensions and significant dry wildcats, supplemented with state, field and area maps; and summary information on regional trends.

Approximately 2055 discoveries and step-out wells, with 579 influential failures are detailed as to name, location, completion date, producing zone, producing interval, official gage, elevation, formation tops, total depth, casing points and other pertinent historical material.

•

THE OIL & GAS FIELDS OF SOUTHEAST LOUISIANA, Five Star Oil Report, Inc., P. O. Box 331, Houston, Texas.

Location, discovery, productive zones and production records are among the data presented for each field in each of the 32 parishes comprising southeast Louisiana. In this most recent reference book on oil and gas development in the area, offshore fields are included. Survey maps, pipe line maps, land plats, structural maps and electrical logs are some of the 195 illustrations supplementing the text.

Parishes covered include Ascension, Assumption, East Baton Rouge, East Feliciana, Iberville, Jefferson, Lafourche, Livingston, Orleans, Plaquemines, Pointe Coupee, St. Bernard, St. Charles, St. Helena, St. James, St. John the Baptist, St. Tammany, Tangipahoa, Terrebonne, Washington, West Baton Rouge and West Feliciana.

Operations in southwest Louisiana were summarized in an earlier volume.

Koenig

SERVALL BODIES

. . . for those TOUGH JOBS!

Koenig Servall Truck Bodies are offered in ½-, ¾-, and 1-ton sizes . . . ideal for electricians, air-conditioning specialists, plumbers and general maintenance work. Special adaptations of this body available.

Koenig Servall Utility Bodies are built to customer specifications . . . available in *all* sizes for *all jobs*. Our body engineers can design a unit to fit your specific needs. Write for detailed information.

Write for literature on
KOENIG ALL-STEEL CABS FOR JEEPS

KOENIG SERVALL BODY

KOENIG UTILITY BODY

KING WINCHES

King Winch on R-140 and R-160 International

P.T.O.-driven King Winch on Willys Jeep *

KING WINCHES FOR KING-SIZE PULLING JOBS

For all Willys Jeeps, trucks and 4 x 4 station wagons . . . also for Ford, Chevrolet, International and Dodge trucks.

King Winches keep you moving through the most difficult terrain . . . you get action where there's no traction with dependable pulling power. King power winches have pulling capacities of 8,000 to 19,000 lbs.

* POWER-TAKE-OFF-DRIVEN KING WINCH MODELS 130J and 131J for CJ-3B and older-model Jeeps, can be transferred to CJ-5 and CJ-6 Jeeps—NOTHING EXTRA NEEDED.

Koenig Jeep cabs and King Winches for Willys vehicles are available through Willys Motors, Inc., and Willys-Overland Export Corp. distributors or dealers. Write for free descriptive literature.

Koenig IRON WORKS, Inc.
2214 Washington Ave. Houston, Texas

What's Happening

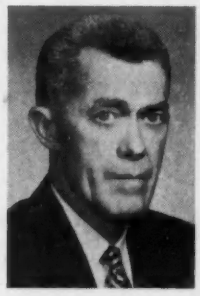
AMONG SERVICE AND SUPPLY MEN

Thomas J. Loomis

L. G. Janzow

Tom Moughon

M. D. Lackey



R. T. Buffington

T. C. Lemcke

McCullough Tool Company announces the appointment of **Thomas J. Loomis** as sales engineer at the Casper, Wyo., service location. Before joining the company in 1953 Lomis was a draftsman for the Ohio Oil Company at Casper, and an employe of Arctic Contractors, a seismograph company with headquarters at Point Barrow, Alaska.

•

L. G. Janzow, appointed vice president and general manager of the California Steel Products Division of **Adsco Industries, Inc.**, has been serving as vice president in charge of engineering since joining the organization in 1954. He formerly was with Western States Mining and Manufacturing Company and Southwestern Engineering Company.

•

Tom Moughon has been promoted to assistant chief engineer of **Unit Rig & Equipment Company.** Prior to joining the firm in 1946, he had ten years' design experience with other manufacturers of oil field equipment. He also was with Service Drilling Company. **M. D. Lackey**, appointed development engineer for the company, will work on research and development of new products. Prior to joining Unit Rig in 1952, he was with Westinghouse Electric Company.

•

R. T. Buffington, who for the past 12 years has been comptroller of Silas Mason Company of New York, has been appointed comptroller of **The J. B. Beaird Compaany, Inc.** In his new position, Buffington will supervise inter-plant accounting procedures for Beaird's integrated manufacturing division. He joined Silas Mason in 1941 as chief accountant and was named comptroller in 1944.

•

T. C. Lemcke, newly-appointed technical representative of the **Reed Roller Bit Company** in London, is now on a four-months' trip to oil operations in the Near East and Middle East for the Houston oil tool manufacturing firm. He will return to London in mid-summer. Lemcke

An entire lease is controlled accurately and precisely in minutes through this battery of Willis Rotary Adjustable Chokes.

6 ways better

flow control

PROVIDES 6 different sized choke inserts which are individually positioned in the line of flow by a fractional turn of the orifice-carrying disc . . . under constant flow and high pressure.

The 6 graduated orifices are changed to a new range in minutes...without shutting-in the well.

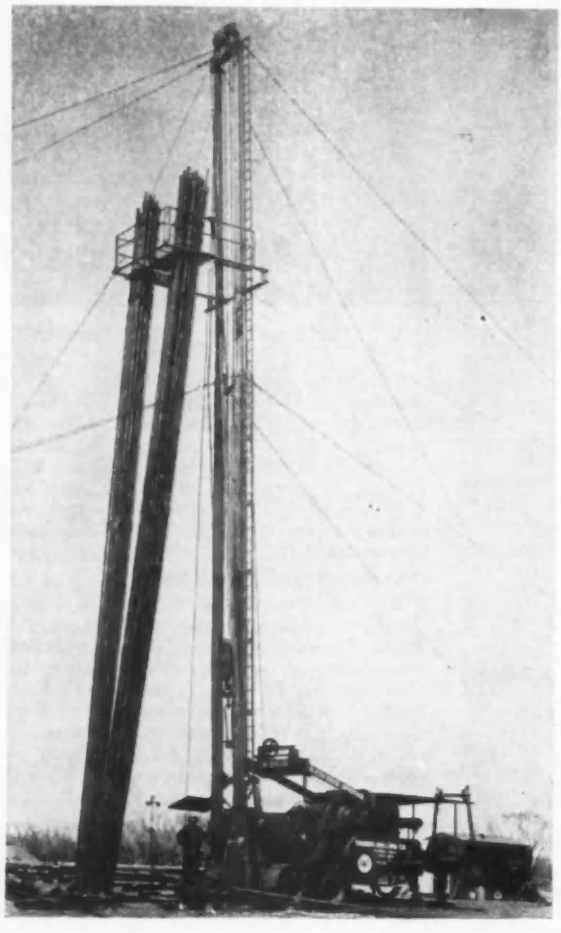
A positive shut-in is made by inserting a blank orifice.

WILLIS OIL TOOL COMPANY

3440 Pine Ave., Long Beach 7, California

Houston: 2012 Taft Street **Odessa: 100 N. Texas Street**

Pulls 4000′ of Tubing Per Hour

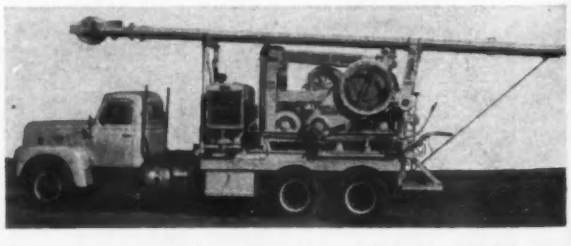


Walker-Neer's 82-foot mast with fingerboard enables tubing to be racked in doubles . . . combines derrick capacity with mast-pole portability! This feature is available on Models C-34 and C-37. Pictured: Model C-34 purchased recently by Sooner Drilling Co., Shawnee, Oklahoma.

WALKER-NEER "C" SERIES Well Completion and Workover Spudders

The "C" Series includes five 3-drum models and four 2-drum models, all designed specifically as well completion and workover spudders. They equip you to handle with one machine and in record time, every pulling and drilling operation in well servicing, "frac" work, and well completion.

• Full width drums throughout • All drums chain driven and geared for maximum speed • Double, self-energizing, self-equalizing brakes on all drums • All drums, masthead sheaves, clutches, and adaptors mounted on sealed roller and ball bearings • Powerful, beam-type spudding action • Fingertip controls grouped at operator's platform • Traveling spudding sheave and heel sheave assure automatic spooling • Full floating sand reel • Compact design for maximum portability • Outstandingly safe and fireproof.



Three-drum models range from 2000′ to 8000′ capacity: two-drum models range from 2000′ to 7000′ capacity. All models except C-37 (8000′) and C-34 (6000′) can be truck mounted. Pictured above, Model C-32.

WALKER-NEER

MANUFACTURING COMPANY, INC.

P. O. BOX 2490 WICHITA FALLS, TEXAS

DISTRIBUTORS: Oil Well Supply Division • Bovaird Supply Co. • Jones & Laughlin Supply Division • Industrial Motor Service, Hoisington, Kansas • E. D. Taylor Co., Montebello, Calif. • Acme Well Supply (exclusive export agent except on North American Continent)

W. E. Scarborough

E. E. Finklea

has been with Reed since 1939 when he was employed as sales serviceman in California. He has since traveled extensively as a representative of the company in Europe, Asia and South America. Before accepting the London assignment, he was sales training supervisor in Houston.

•

W. E. Scarborough's appointment as assistant chief engineer has been announced by **Security Engineering Division**, one of the Dresser Industries. Scarborough will direct Security's field engineering services and will head engineering activities at the company's Whittier, Calif., plant. He was an instructor in the Mechanical Engineering department of Texas A&M College before joining the oil industry in 1936.

•

Ernest E. Finklea has joined **Schlumberger Well Surveying Corporation** as assistant to the Mid-Continent area manager with headquarters in Tulsa. Prior to joining Schlumberger, he was employed by Geophysical Research Corporation as research engineer and later by Amerada as log analysist. Finklea has had years of experience in the analysis of electrical logs. In his new position he will assist Oklahoma oil operators with log interpretations.

•

Baker Oil Tools, Inc., Central division headquarters, Houston, recently announced personnel transfers and new appointments in the division. **J. T. Mitchell**, former branch manager, Odessa, Texas, has been appointed assistant district manager, West Texas district, with headquarters in Odessa. **J. V. Bergman**, branch manager, Farmington, N. M., will transfer to Midland, Texas, as district sales engineer, West Texas district. **L. Grubenman**, former representative in Maracaibo, Venezuela, has been appointed branch manager at Shreveport, La. **S. O. Timmons, Jr.**, branch manager, Palestine, Texas, has been transferred to a similar post in Odessa, and **E. M. Solter**, branch manager, El Dorado, Kansas, has been transferred to Great Bend, Kansas, as branch manager. New appointments include **D. A. Moody**, new branch manager, Victoria, Texas; **W. A. Shelton**, branch manager, El Dorado, Kansas; **C. M. Courtney**, branch manager, Palestine, Texas; and **Jack Hoffman**, branch manager, Snyder, Texas.

•

John A. Sargent, president of Diamond Alkali Company, has been elected a director of **The White Motor Company.** Before joining Diamond Alkali in 1946, Sargent was sales manager of the Truscon Steel Company, subsidiary of Republic Steel Corporation.

IVERSON
SUPPLY COMPANY
30th ANNIVERSARY

FASTEST
SUPPLY STORE SERVICE
IN THE SOUTHWEST . . .

FIRST
IN THE
ARTESIA,
NEW MEXICO
AREA

CHECK WITH IVERSON
whatever your requirements

For 30 years, the IVERSON SUPPLY STORE in Artesia, New Mexico has serviced oilfields in Eastern New Mexico and West Texas with the finest, most complete round-the-clock service possible.

In the Artesia area, the IVERSON SUPPLY COMPANY is known for the speed and efficiency with which customers orders are filled. All equipment handled by IVERSON SUPPLY COMPANY is backed by the IVERSON Guarantee of Satisfaction.

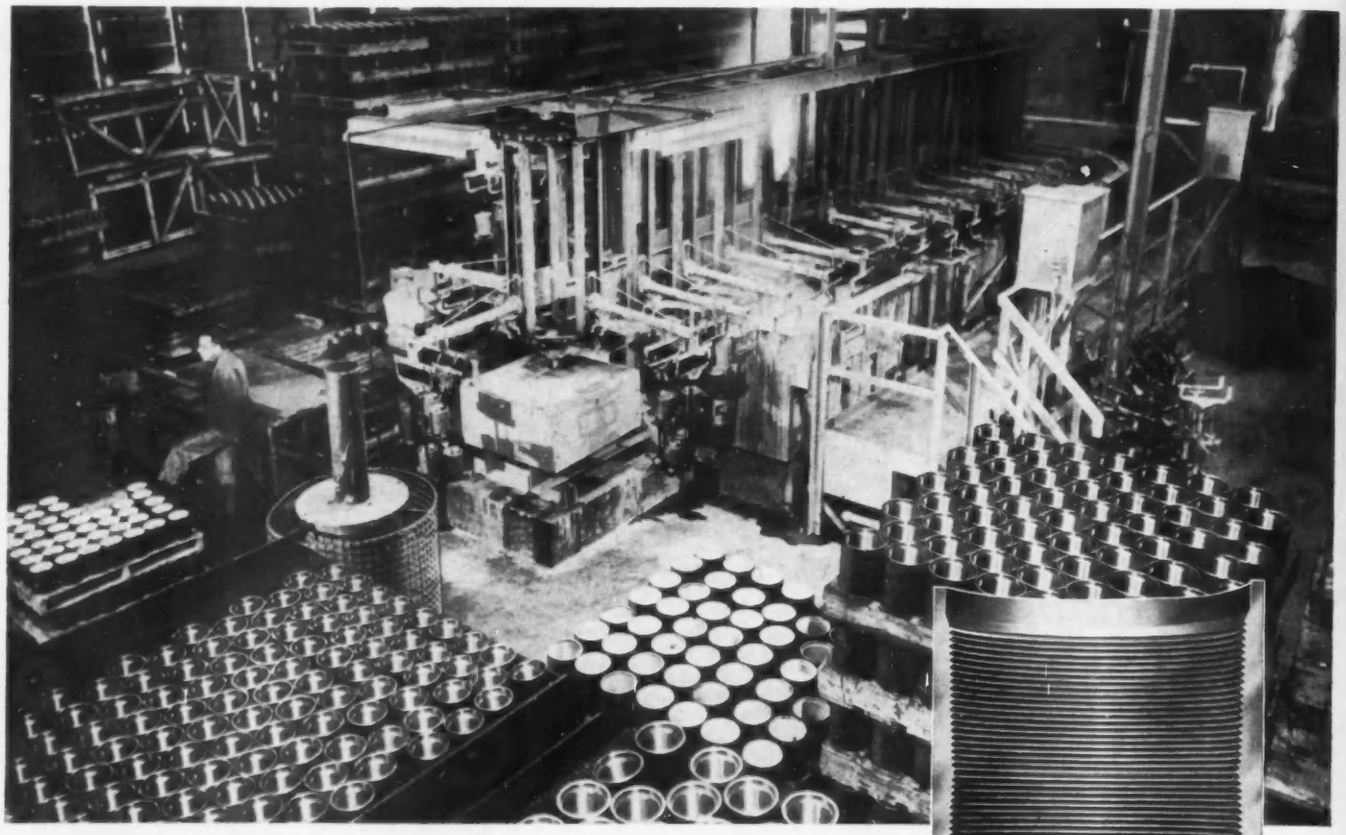
IVERSON SUPPLY STORES
OKLAHOMA — Oklahoma City, Okmulgee, Tulsa.
NEW MEXICO — Artesia, Farmington.
TEXAS — Kermit, Odessa, Sherman, Snyder.

30th Anniversary
IVERSON SUPPLY CO.
1926 — 1956

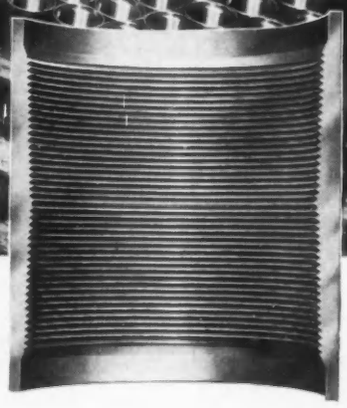
OFFICES: FT. WORTH, DALLAS & MIDLAND, TEXAS

IVERSON SUPPLY COMPANY
DRILLING-PRODUCTION AND REFINERY EQUIPMENT
GENERAL OFFICES
P. O. BOX 1439 TULSA 1, OKLA.

OFFICES: DENVER, COLORADO TULSA, OKLAHOMA



Continuous electrogalvanizing unit for CF&I Seamless Couplings.



Cross section photograph of actual CF&I Seamless Coupling.

CF&I QUALITY COUPLINGS FOR SEAMLESS CASING AND TUBING

Rigid manufacturing standards, testing and re-testing are typical of the care CF&I exercises from mine through manufacture. These manufacturing standards assure Seamless Tubular Products of the highest quality.

The stresses imposed on oil country tubing and casing joints demand exacting manufacturing controls. One requirement in obtaining quality joints is to have a tight seal between the coupling and the pipe. This can be obtained only if the couplings and pipe are manufactured under the strictest specifications.

API Specifications require that all couplings must be processed to minimize galling. CF&I electrogalvanizes all couplings and exceeds this specification by carefully controlling the exact thickness of pure zinc—just enough zinc to prevent galling, but not enough to fill in the threads. This is just one example of the extra care which CF&I takes in the manufacturing process of their Seamless Tubular Products.

CF&I Seamless Oil Country Casing and Tubing meets API STD 5A Specifications—in sizes from 2⅜" O.D. through 9⅝" O.D.

3894

SEAMLESS TUBULAR PRODUCTS

THE COLORADO FUEL AND IRON CORPORATION

Denver, Colorado

CF&I

By the makers of
DARCOVA
...the original composition cup

Darcova Valve Cup

NOW!...
100% NYLON COMPOSITION

Darcova 45° Bevel Cup

- INCREASED STRENGTH
- LONGER LIFE
- LESS REPLACEMENT
- FEWER WELL PULLING JOBS

Darcova 100% nylon composition valve cups, seating cups and seating rings are available *now* in Darcova's full range of sizes and textures for *all* requirements.

Send for Bulletin No. 5502 and be sure to specify DARCOVA at your supply store. There is no substitute!

DARLING VALVE & MANUFACTURING COMPANY
DARCOVA
THE ORIGINAL COMPOSITION CUP
WILLIAMSPORT 28, PA.

M. L. Habzda

E. M. Gearke

Richard M. Firth

Charles G. Tullis

M. L. Habzda, recently named supervisor of industrial and general account sales in the Service division of **White Motor Company,** will be responsible for sales development of the White industrial engine program. Currently he is working with the company's field organization in promoting sales of White Mustang engines for industrial, marine and other engine applications. Habzda has been with White three years in the service department, handling warranty and field service problems.

•

Baash-Ross Tool Company, division of Joy Manufacturing, has announced the appointment of **E. M. Gearke** as assistant general sales manager for the company's widespread operations. With the Baash-Ross organization many years, Gearke has served as sales representative, district sales manager and various other executive capacities in the Gulf Coast, Mid-Continent and West Coast operations of the company. He will headquarter at company offices in Houston.

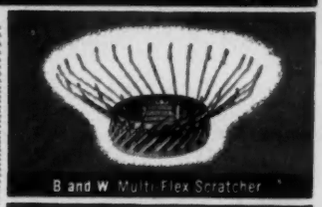
•

Southwest Industries, Inc., has promoted **Richard M. Firth** to vice president of production and engineering and **Charles G. Tullis** to chief engineer. Firth has had many years experience in the packaged compressor field, working with pressure vessels for the petroleum and chemical industries, anhydrous ammonia installations and with packaged gas compressors. Tullis' engineering and professional experience also has been in the field of packaged compressors.

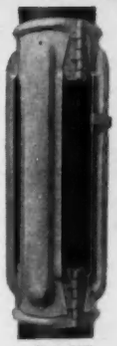
•

American Cyanamid Company's Organic Chemicals division announces the promotion of **R. L. Stout** from supervisor of office services at the Bound Brook, N. J., plant to assistant to the director of sales. Stout joined The Calco Chemical Company, Inc., in 1930 and served as secretary to R. G. Jeffcott and F. M. Fargo, both presidents of Calco. When Calco became the Organic Chemicals division, Stout served as administrative assistant to S. C. Moody, then general manager of the division.

B and W
SCRATCHERS AND CENTRALIZERS


B and W Multi-Flex Scratcher

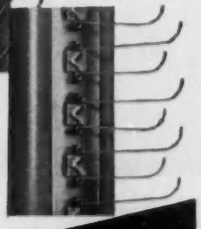
B and W Hinged Nu-Coil Scratcher


B and W Plain Stabilizer

B and W Latch-on Centralizer with Kon-Kave Bow

Multi-Flex Type

B and W Rotating Scratchers


Nu-Coil Type

For a Good Cement Job

Positive Mud Removal and Complete Cement Fill

B and W Inc.
Well Completion Specialists

GULF COAST
Box 5266
Houston 12, Texas
Phone WA-3-6603

WEST COAST
Box 3751
Los Angeles 54, Calif.
Phone DA-4-1106

9406

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Operation "Explosion"

Control of liquids and gases has been a classic problem to designers for endless ages. Never before, however, have valves been called upon to control such a variety of difficult materials under such extreme conditions. Problems of our age present a challenge which has produced radical improvements in valve design.

Here at Cameron the remarkable Non-Lubricated Lift-Plug Valve is working ranges of pressure, volume and time which produce controlled "explosions." These high speed operating cycles simulate actual operating conditions to which our valves are subjected in service applications today.

The versatile Cameron Lift-Plug Valve is replacing more and more ordinary valves in many difficult services. Temperatures to 1600°F., corrosive acids, slurries, LPG and even beverages and foods are among the many applications in which these valves have had outstanding records for a number of years. You may not need to control an "explosion" in your processes but most likely you have a place where the Cameron Non-Lubricated Lift-Plug Valve can save time and money.

Write or call . . .

Cameron

IRON WORKS, INC.

P. O. Box 1212 - Houston, Texas

Export Office, 7912 Empire State Bldg., New York City. In England: Cameron Iron Works, Ltd., Time & Life Bldg., New Bond Street, London W. 1 England.

WORLD LEADER IN DEPENDABLE HIGH PRESSURE CONTROL FOR THE OIL INDUSTRY

James H. Judge

Joe Notely

R. J. Granberry

F. O. Reudelhuber

American Meter Company, Inc., has named **James H. Judge** assistant to the president, a newly-created position. He will be engaged primarily on special projects concerning positive displacement liquid metering, a field in which he has had more than 32 years' experience. Judge has been with the Neptune Meter Company, the Mueller Company and Rockwell Manufacturing Company. He resigned as product sales manager in the Petroleum and Industrial Liquid Meter division of Rockwell in 1955.

•

Joe Notely has been promoted to manager of the Seminole, Okla., branch of **National Tank Company.** He succeeds Joe Marshall, long-time National employe who recently retired. Notely transferred from the Oklahoma City branch to Seminole in 1944 as an office man, and since 1948 has been in sales and service.

•

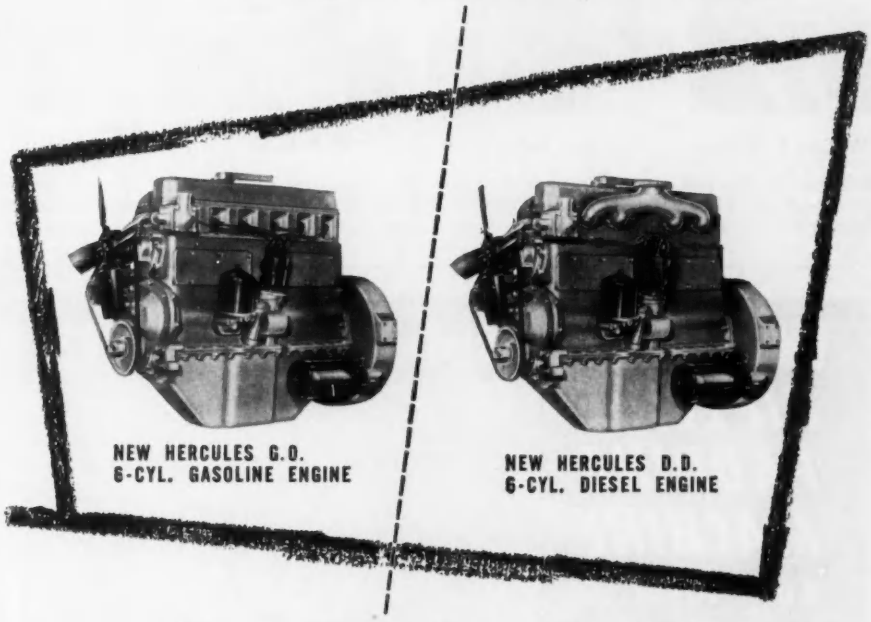
Core Laboratories, Inc., has announced major personnel changes in its Texas and Louisiana operations. **R. J. Granberry,** member of Core Lab's board of directors and formerly district manager in Houston, has been transferred to Lafayette, La., where he will serve in the same capacity as manager of the firm's integrated formation evaluation services throughout the South Louisiana area. **Frank O. Reudelhuber,** formerly manager of Core Lab's reservoir fluids division in Dallas, has been promoted to manager of Upper Texas Gulf Coast operations. He will direct the firm's services from offices and labs located in Houston.

•

William H. Muchnic, president of Locomotive Finished Materials (or LFM) Company which merged with **Rockwell Manufacturing Company** in February, has been elected a director of Rockwell. President of LFM since 1952, Muchnic joined the company as a plant engineer in 1946 and was named assistant to the president in 1948.

WHEN YOU BUY AN ENGINE

. . . what's the first thing to look for?



Of course, some people look at the "outside" of an engine and see only a nice shiny paint-job. But that's not too important. Other buyers look at what's "inside" an engine. That can be very important. However, we think a buyer should also look at what's "back of" an engine. That's why we at Hercules Motors Corporation guard the enviable reputation we have earned in more than 41 years of engine building experience.

Hercules' reputation isn't merely a way of doing business or just the top quality of our product. We feel that our reputation means more than good business ethics and a quality product. Our reputation also means supplying new and better engines to meet the various needs of our customers.

As an example, our new line of INTERCHANGEABLE engines gives the customer the choice of gasoline or diesel power without changing engine mountings in the end product. These new G.O. (Gasoline Overhead valve) and D.D. (Direct injection Diesel) engines, not only have the same mounting dimensions in engines of the same number of cylinders, but many component parts are also interchangeable over the entire range of these new models.

Years of engine building "know how" stand "back of" every Hercules Engine. In addition, our wide selection of more than 90 models of engines and power units, available for operation on gasoline, diesel fuel, natural gas, L.P.G. and kerosene, provides a dependable source of power for all requirements between 3 and 500 H.P.

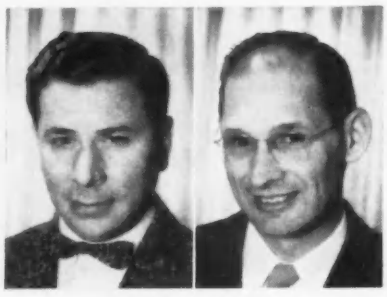
For help in solving your power problems, contact our factory. Our sales-engineers will be glad to assist you. No obligation, of course.

HERCULES MOTORS CORPORATION

CANTON 2, OHIO

William L. Parcell

Earl Fuller



H. E. Mohr A. W. Higgs

Alfred Herndon

Erwin Kessler

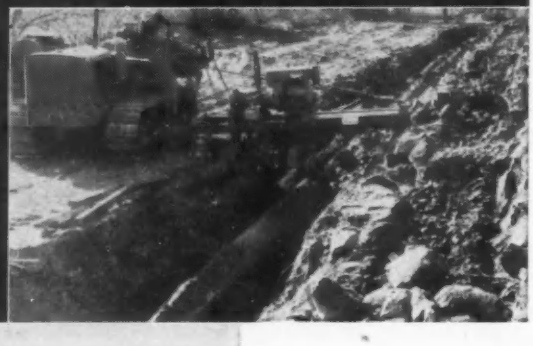
William L. Parcell, recently named vice president of **The Ridge Tool Company,** celebrates his twentieth anniversary with the company this month. He served as sales manager prior to his recent promotion and continues as director of sales.

WISCONSIN-POWERED

PIPELINE PADDING MACHINE

Cuts Costs...

Protects Pipe



This machine is the product of M. J. Crose Mfg. Co., leading builders of wrapping and coating machines, tar heating kettles, pipe rolling rigs and many other types of pipeline equipment . . . utilizing Wisconsin Engine power wherever possible.

Dirt-padding of the bitumen-coated, wrapped pipelines under construction in rocky terrain is a time- and cost-saving technique, as handled by this unique piece of Crose equipment. In place of using sheet shielding or dirt-filled sack "breakies", this machine salvages available dirt from the rocky backfill of the spoil bank, conveys and spots it over the ditch, dropping the dirt alongside and over the pipe, as needed.

The rotating head at the end of an auger-type conveyor sorts and sifts dirt from the backfill spoil bank, screening out all material over 2-in. in diameter. A Wisconsin Model VG4D V-type 4-cylinder power unit, mounted on the hydraulically controlled boom, provides dependable, all-weather power for the padding machine which is handled by the tractor operator.

This is another oil-field assignment that calls for the rugged serviceability and the *basic high-torque design* of Wisconsin Heavy-Duty Air-Cooled Engines. The M. J. Crose Manufacturing Co., like many other leading builders of oil field and pipeline equipment, has used WISCONSIN Air-Cooled Engines as standard, original equipment almost since their inception. These builders know the score, based on performance records in the field and place their power bets accordingly . . . in favor of Wisconsin Engines. You can't do better than to specify "WISCONSIN POWER" for your equipment.

WISCONSIN MOTOR Corporation
MILWAUKEE 46, WISCONSIN
World's Largest Builders of Heavy-Duty Air-Cooled Engines

WRITE TO HARLEY SALES CO.
619 SOUTH MAIN STREET • TULSA, OKLAHOMA
3420 McKINNEY AVENUE • HOUSTON, TEXAS
505 SOUTH MAIN STREET • WICHITA, KANSAS
OIL FIELD DISTRIBUTORS FOR WISCONSIN ENGINES AND ALL TYPES OF UTILITY UNITS

A 8845-½I

Web Wilson Oil Tool, Inc. announces the appointment of **Earl Fuller** as sales representative for the countries of Pakistan, India, Burma, British Borneo and Indonesia. For many years he has lived in Bandung, Java, Indonesia, which will be headquarters for the company in the Far East. In the U. S., **H. E. (Ted) Mohr** and **A. W. (Tony) Higgs** will assist in sales for the company in the Rocky Mountain area. Higgs will cover the northern part of the territory from Casper, Wyo.; Mohr will cover the Southern part, including the Julesburg Basin. Both recently completed a training course at the Web Wilson plant and general offices in Los Angeles.

•

Alfred Herndon has been appointed representative for **Rector Well Equipment Company, Inc.** at Casper, Wyo. He previously worked for Waukesha Engine and Equipment Company at Casper and Williston, N. D., and with Visco Chemical Company in Houston and the Rocky Mountain area.

•

Goodall Rubber Company of Texas announces the appointment of **Erwin Kessler** as sales representative in Southern Louisiana, southern and East Texas. Kessler previously was with Shell Chemical Company and Halliburton Oil Well Cementing Company.

•

Atlas Powder Company has announced that **Dr. Sydney Steele,** formerly director of the planning staff, has been named industrial assistant to the vice president in charge of the Chemicals division. He will assist in the division's diversification planning and other special assignments. The company also announced establishment of the Economic Evaluations department in the Chemicals division to conduct economic studies on all projects and expenditure programs for the division. **Robert J. Reilly** has been appointed director of the new department. **James Weaver** and **Frank Lyndall, Jr.,** also are on the staff.

•

Dowell Incorporated has announced that **Ed W. Smith** has been promoted to assistant treasurer and **Tom R. Harrison** to chief accountant in the company's general offices in Tulsa. Smith, who joined Dowell as a traveling auditor in 1946, has since been accountant, accounting supervisor and chief accountant. Harrison joined Dowell in 1950, moving from Haskins and Sells, Certified Public Accountants. His positions with Dowell have included accountant, payroll and tax supervisor, general accounting supervisor and assistant chief accountant.

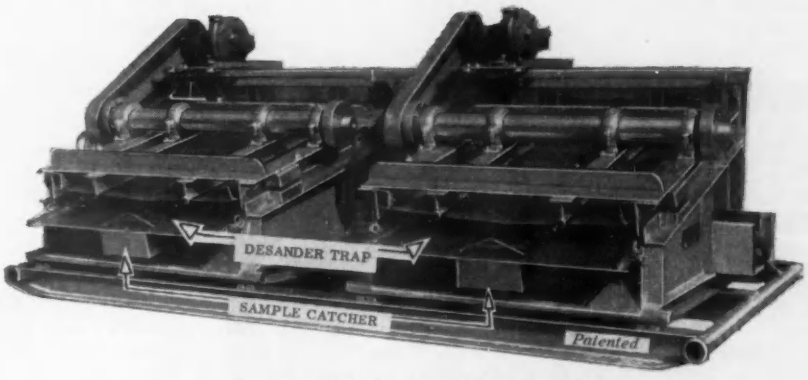
AVAST! SEA GOING CONTRACTORS

LOOK IT'S NEW

A DUAL DESANDER

BY "RUMBA"

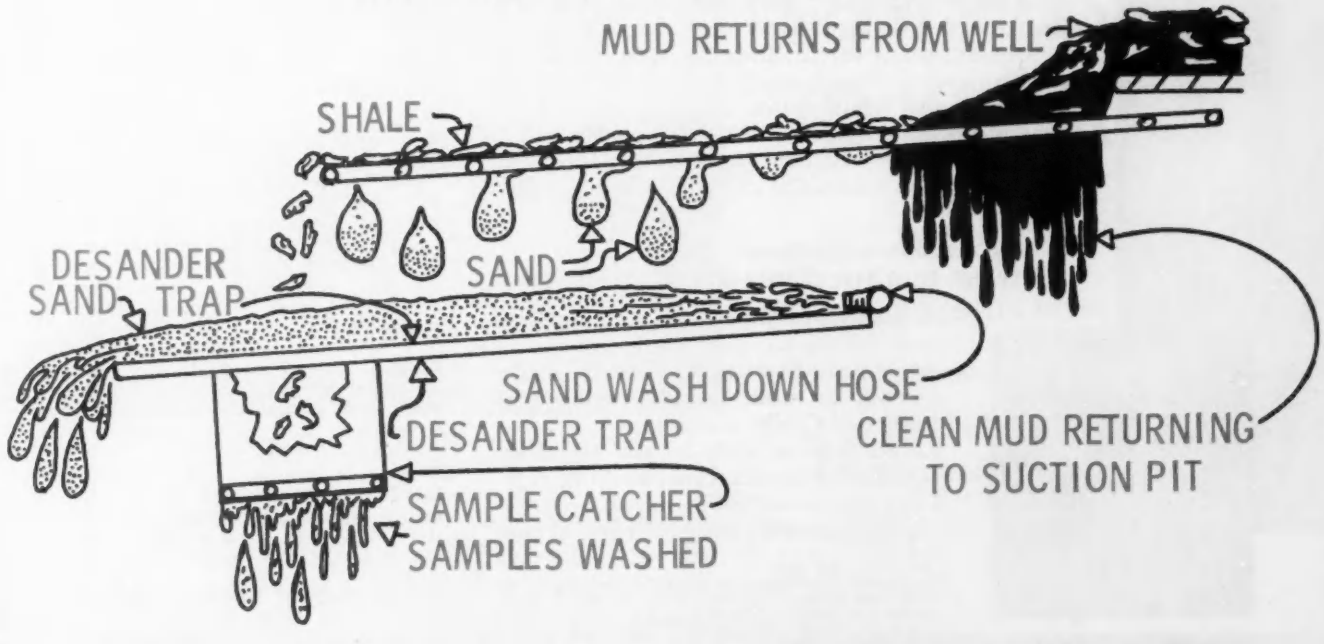
In Service Continuously When Pumps Are Running



Dual Model Catalog No. 4860-DU
Removes Sand and Shale

SAVES Pump Repairs
SAVES Drill Pipe Cutting Out
SAVES Long Fishing Jobs
SAVES Bit Wear Less Trips
SAVES Drilling Time
SAVES Time Setting Casing
SAVES Drill Pipe Sticking
SAVES Mud Waste by Less Frequent Sand Trap Dumping
SAVES Costly Mud Transportation

THIS IS HOW SAND IS SEPARATED FROM MUD



DESANDING ACTION STARTS WITH MUD FLOW

HUTCHISON MANUFACTURING COMPANY

6609 Avenue U, Houston 11, Texas

R. L. Rhodes

James T. Brown

Milton Kramer

T. L. Fontaine

Milton Pierce

David D. Klager

The Lufkin Foundry and Machine Company announces the assignment of three men to the sales and service staff. **Richard L. Rhodes** has been named service engineer for north Texas and southern Oklahoma, having completed his factory training on installation and service of Lufkin pumping units and gas engines. He will headquarter in the Wichita Falls, Texas, branch office. **James T. Brown** also has completed training in the home office in Lufkin and has been assigned to the Odessa, Texas, branch office. He will be engaged in the sale of Lufkin pumping units and gas engines in the West Texas-New Mexico area. **Milton Kramer,** transferred from Lufkin to Houston, will be engaged in the sale of Lufkin commercial gears.

•

T. L. (Doc) Fontaine, as newly-appointed executive vice president of **Hunt Tool Company,** will be responsible for the company's expansion program. In addition to repair and general fabricating work for the drilling and production segments of the oil industry, Hunt plans to expand its service to the chemical and electric industries. Fontaine's background covers all phases of drilling and production of oil in the U. S. and abroad, as well as the manufacture of valves, well head equipment and specialized oil tools. He is resigning as sales manager for oil tools of Alco Products, Inc.

•

Milton Pierce, who recently joined **Oil Center Tool Company's** sales and service force, will be stationed in the Odessa office. He formerly was with National Supply Company.

•

David D. Klager has been appointed operations manager of the Odessa branch of **Stewart & Stevenson Services.** He joined the company in 1951.

•

A. B. Drastrup, formerly president of the A. M. Byers Company, has been appointed vice president of **Joy Manufacturing Company,** with headquarters at Joy's executive offices in Pittsburgh. He was an accountant with the Indiana Steel Company from 1926 to 1928 and joined Columbia Steel Company in 1928 in a similar position. He joined Byers Company in 1931.

•

Earle L. Kropscott, recently promoted to staff manager of molding materials for **The Dow Chemical Company's** Plastics department, has been an assistant manager of Plastics Technical Service since 1946. In his new position he will be responsible for long-range planning for molding materials. Kropscott started with Dow in the Cellulose Products section in 1937.

•

Bovaird Supply Company recently promoted **J. L. (Joe) Smith** to sales representative in the Denver regional office. He formerly was store manager at Liberal, Kansas, and field salesman at Great Bend, Kansas. **R. T. Hayes** has been promoted from field salesman to store manager at Liberal, and **Dewey Barnard,** store clerk at Liberal, has been promoted to field salesman. **B. J. Mitchell** has been named field salesman at the Pawhuska, Okla., store. He was promoted from store clerk.

DRILL LARGE DIAMETER HOLES THE MODERN WAY . . . WITH

SPANG FABRICATED STAR BITS

Progressive Operators Everywhere Are Discovering This Modern, Better Way Of Drilling Large Diameter Holes.

SPANG FABRICATED STAR BITS replace the conventional, old-style spudding bit and the big hole paddle-type bit. They are made in large diameters for drilling hard formations, and can be dressed, ready for drilling, by hard surfacing quickly and economically, thereby saving the time consumed heating and ramming. Made in a variety of diameters, lengths and weights, with any size joint desired, SPANG Fabricated STAR BITS are your assurance of profitable **big hole** drilling.

For Extremely Large Diameter Holes
SPANG PILOT-TYPE REAMER BITS ARE RECOMMENDED

Field performance has amply proved these bits to be the driller's answer to **large hole** problems. They are made special, to your specifications and design, in any diameter; size and weight limited only by the handling capacity of conventional drilling rigs. They can be furnished to run on drilling stem or with integral rope socket top.

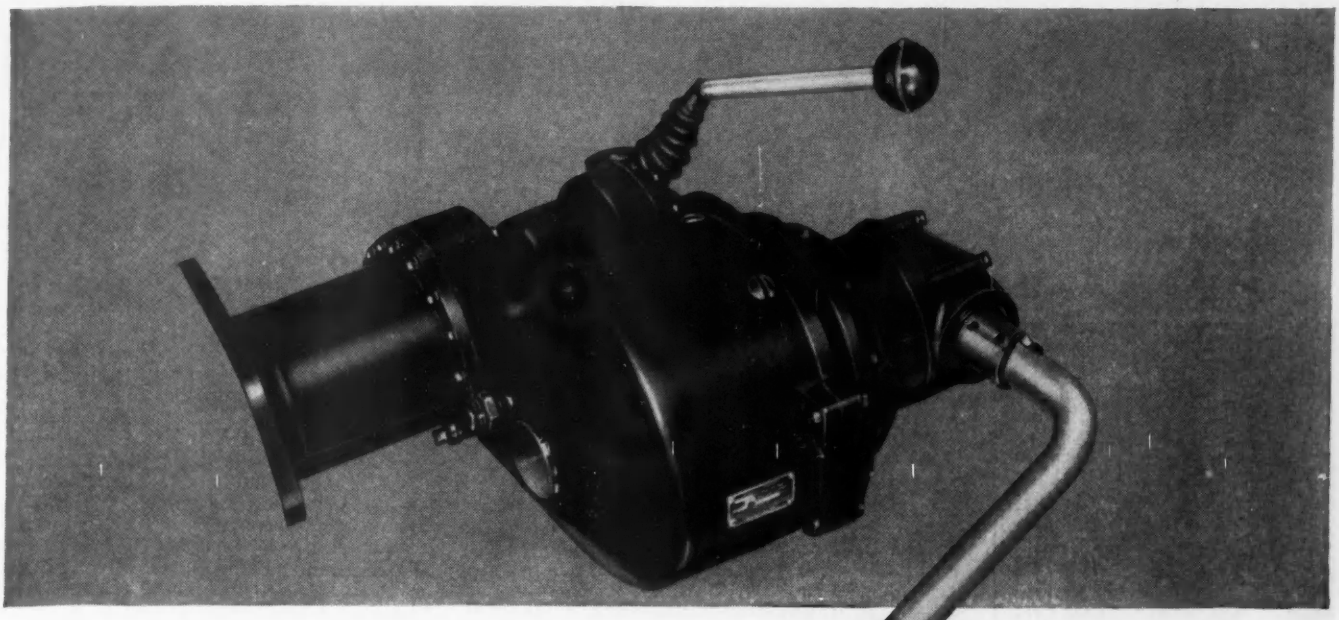
PILOT-TYPE REAMER BIT

For detailed information on SPANG Fabricated STAR BITS and SPANG PILOT-TYPE REAMER BITS for big hole drilling, plus 52 page CATALOG, consult your nearest SPANG DEALER or write direct to

SPANG & COMPANY

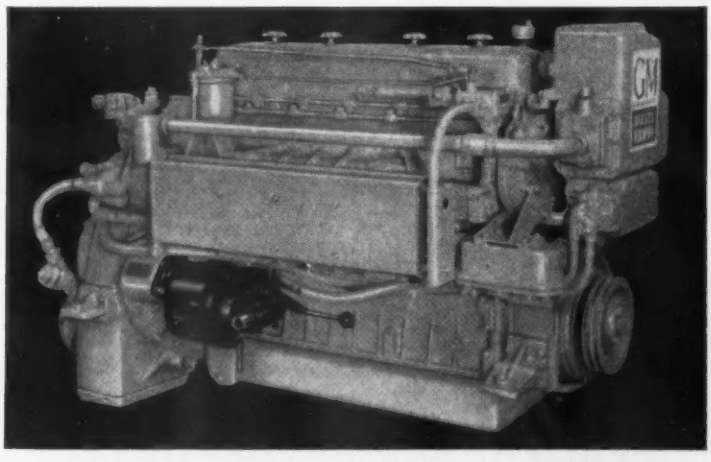
DEPT. O-6 BUTLER, PENNSYLVANIA

For over 60 years Manufacturers of Spang Weldless Jars and a Complete Line of Cable System Drilling and Fishing Tools for Oil and Gas Wells, Water Wells, Prospect Drilling and Shot Blast Holes.



Bendix* AE

HAND-CRANKED INERTIA STARTER



Performance proved on thousands of diesel- and ignition-fired marine and industrial engine installations.

To low installation cost, add rugged, simple design and dependable operation. Then you have the explanation of why the Bendix AE hand-cranked inertia starter is in such big demand by men in the oil, marine, construction, agriculture and mining fields. Particularly in remote areas and under difficult operating and climatic conditions, this starter fills a very real need. For full details write BENDIX INTERNATIONAL, DIVISION OF BENDIX AVIATION CORPORATION, 205 East 42nd Street, New York 17, N.Y. Cable: "Bendixint", N.Y.

COSTS LESS TO INSTALL

HERE'S WHY:

- **Requires NO CABLES, NO PUMPS, NO PLUMBING**
- **More easily mounted and in more positions**
- **Can be installed in ten minutes without the use of any special tools**
- **Completely self contained . . . no "extras" to buy**

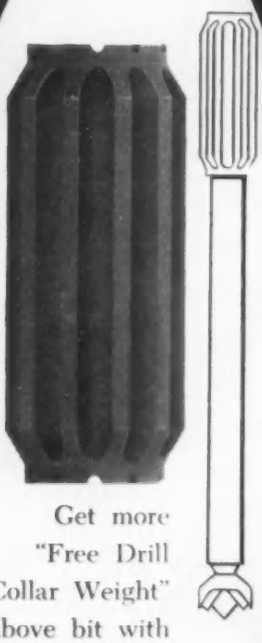
*REG. U.S. PAT. OFFICE.

Bendix INTERNATIONAL Product

Bendix AVIATION CORPORATION

how to

drill straighter holes with heavier weight



Get more "Free Drill Collar Weight" above bit with DRILCO RUBBER STABILIZERS*

*patented

DRILCO

OIL TOOLS, INC.

Box 1676 • Midland, Texas

REPRESENTATIVES:

Oklahoma-North Texas
Norbro Sales Co., Oklahoma City—Sherman, Texas

Rocky Mountains
K & W Sales Co., Casper, Wyoming

Texas Panhandle-Kansas
C & W Machine Co., Liberal, Kansas

Farmington-Western Colorado
Nelson Specialty Co., Farmington, N. M.

L. J. Lawrence

R. Carson Allan

James H. Wiegand

Gordon G. Wilbur

Houston Oil Field Material Company, Inc., recently elected **L. J. (Joe) Lawrence** administrative vice president. He is to retain the office of assistant secretary-treasurer to which he was elected in 1952. He was elected to the board of directors in 1953. Lawrence joined Homco in 1936.

•

R. Carson Allan has been appointed manager for **The National Supply Company** in Venezuela. He succeeds **J. S. Blair, Jr.,** recently named sales manager, drilling equipment, with headquarters in Pittsburgh. The company operates in Venezuela through The National Supply Company of Venezuela, C. A., wholly-owned subsidiary, with headquarters in Caracas. Allan joined National Supply in 1938, later serving in the Engineering department of the Toledo plant and in the Export division. Since 1954 he has been district manager in western Venezuela.

•

Dr. James H. Wiegand has been appointed vice president and technical director of **Jet Research Center, Inc.,** after serving, since 1953, as chairman, Department of Chemistry and Chemical Engineering, Southwest Research Institute. He will direct research and development activities of the Center at Arlington, Texas, on improved shaped charges for oil well perforation. For seven years after World War II, Wiegand was with the U. S. Naval Ordance Test Station where he supervised propellant and rocket development.

•

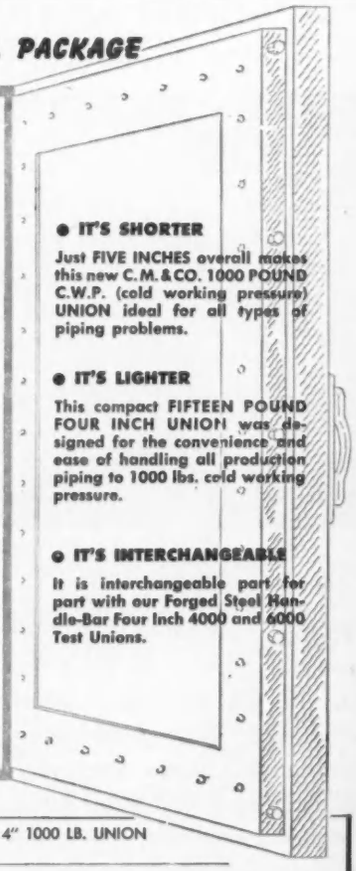
Gordon G. Wilbur, newly-appointed vice president of **Ideco,** one of the Dresser Industries, will be in charge of export sales and have general administrative responsibilities. Joining the company in 1939, he has held various key positions in the sales and technical service departments during the past 16 years. Prior to his recent promotion, he was assistant to the executive vice president at the Dallas headquarters.

Now THE BEST IN A SMALL PACKAGE

NEW 4" 1000 LB. C.W.P. HANDLE-BAR UNIONS

easily opened and tightly closed

Are Doors to the Pipeline



• IT'S SHORTER

Just FIVE INCHES overall makes this new C.M.&CO. 1000 POUND C.W.P. (cold working pressure) UNION ideal for all types of piping problems.

• IT'S LIGHTER

This compact FIFTEEN POUND FOUR INCH UNION was designed for the convenience and ease of handling all production piping to 1000 lbs. cold working pressure.

• IT'S INTERCHANGEABLE

It is interchangeable part for part with our Forged Steel Handle-Bar Four Inch 4000 and 6000 Test Unions.

MAIL THIS COUPON TODAY!

PLEASE SEND THE COMPLETE STORY AND PRICES ON THIS NEW 4" 1000 LB. UNION

NAME_____

ADDRESS_____ CITY_____ ZONE____ STATE_____

CLAYTON MARK & COMPANY • 1900 DEMPSTER ST. • EVANSTON, ILL.

flexible rig in sight

Sun Oil Company's new Ideco rig with Electro-Motive Diesel-Electric Drive takes the draw works off the drilling floor

Innovation in deep-well drilling rigs is the new unit built for Sun Oil Company by Ideco, one of the Dresser Industries, at its plant in Beaumont, Texas.

Powered by a pair of Electro-Motive SR-8 Diesel-Electric generator sets driving 7 motors, this revolutionary rig offers entirely new standards of flexibility, efficiency and economy.

Only one motor, powering the rotary table and cathead, is mounted on the platform. The Ideco 2500 series electric draw works is located beneath. This design avoids clutter, saves space and makes the rig easier and more economical to move.

Electro-Motive Drilling Rig Power Plants can be used with *any* drilling equipment operating today. The motors driving draw works, rotary table and mud pumps are connected by flexible cable to the generating units—and the connections can be made by anyone with a simple understanding of house lighting.

But to make doubly sure the equipment is properly used, we instruct your people both on the job and at our Factory Training Center in La Grange.

For further information about this moneysaving Diesel-Electric power, call your nearest Electro-Motive Representative.

Features of Electro-Motive Drilling Rig Power

Completely Integrated Design—Each of the major components designed and built to work together—*one* manufacturer—*one* source of service responsibility.

Maximum Portability—All components on skids with weight reduced to a minimum. Units are ruggedly built to withstand handling. No position problem—slashes setup and moving time on land rigs.

Unmatched Flexibility—At a flick of the selector switch on the driller's control panel, power can be selected from one or more generators to meet any power requirement.

Simplified Control—Centralized position of all controls for driller's convenience—continuously variable draw works speed control and complete rotary table torque control at the driller's finger tips.

Lower Drilling Costs—Lower first cost and lower cost per well drilled. Smooth electric power—flexible control—means less down time, speeds drilling.

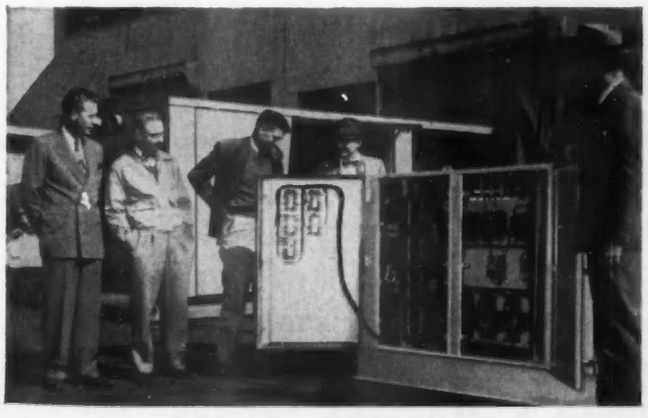
COMPLETE NATIONAL SERVICE AND PARTS AVAILABILITY

ELECTRO-MOTIVE DIVISION

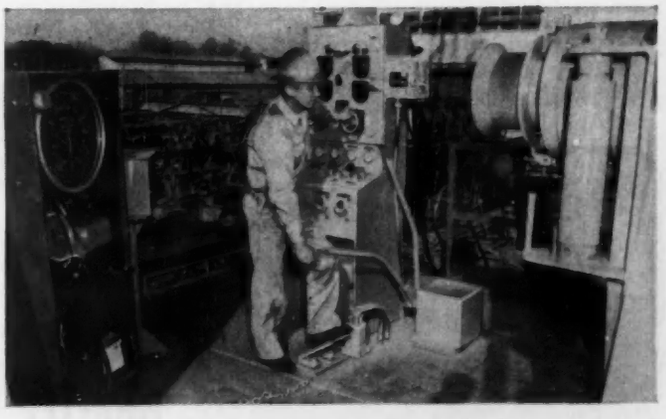
GENERAL MOTORS • La Grange, Illinois

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

Petroleum Industry Sales Offices: 1008 Philtower Building, Tulsa, Oklahoma, and 1222 Texas National Bank Building, Houston, Texas

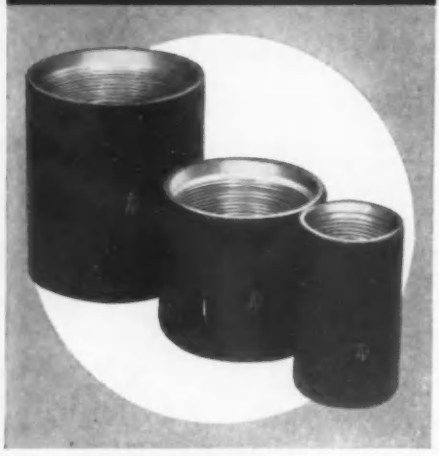


Compact electrical control cabinet utilizes proved components of General Motors Diesel-Electric locomotives. In photo are W. O. Cook, Bert Hefner, Bill Withers, Sun Oil Company, "Buck" Wilder, Sun Oil Company, and A. R. McLerran, Ideco.



Driller's control stand is located on corner of the floor. Control panel carries selector switch, engine speed, mud pump, hoist and rotary table controls, as well as warning lights and safety switches.

ALL COUPLINGS
for the oil industry



A.P.I. LINE COUPLINGS

Sizes ⅛" through 12", 14" and 16" O.D. Black and Galvanized. Recessed, Taper Tapped ¾" per foot.

A.P.I. CASING COUPLINGS

Short and Long, sizes 4½" through 13⅜". All threads 8 round, ¾" taper per foot. Combination casing couplings also available.

A.P.I. TUBING COUPLINGS

Non-Upset sizes 1.900" through 4½". Upset sizes 1.660" through 4".

OTHER OIL INDUSTRY ITEMS

Couplings-Standard Merchant, 3000 and 6000 lb. Hydraulic and all other types of special couplings.
Hex Bushings, Square Head and Hex Head Solid Plugs, Nipples, Unions, Steel Socket Weld Couplings and Caps.

CAP CAPITOL
MFG. & SUPPLY CO.
COLUMBUS, OHIO

COUPLINGS — NIPPLES — UNIONS — RADIANT HEAT FITTINGS — FURNACE COILS — WELL SUPPLIES — STEEL PIPE FITTINGS

Donald E. Kyle

Quentin Marsh

Charles E. Hawk

F. L. Tyler

Donald E. Kyle's appointment as district representative, production equipment—sales, at Gainesville, Texas, has been announced by **United States Steel's** Oil Well Supply Division. Kyle joined Oilwell in 1951 at Anson, Texas, and was appointed field representative at that location in 1954. A year later he was transferred to Gainesville.

•

Quentin Marsh is being transferred from Sperry-Sun of Canada, Ltd., where he served as vice president, to a new position as assistant to the general manager for sales of **Sperry-Sun Well Surveying Company.** After six years with Sun Oil Company, Marsh joined Sperry-Sun in 1948 as sales and service engineer in the tri-state area, moving to Alberta, Canada in 1953 as head of the company's new subsidiary. In addition to his duties in Houston, Marsh will continue as vice president of Canadian operations. **Charles E. Hawk** is promoted from chief engineer to assistant to general manager for manufacturing. He joined Sperry-Sun ten years ago as an engineer in the Research and Development department.

•

F. L. Tyler's appointment as manager of **Reed Roller Bit Company's** European subsidiary, Reed Roller Bit Company (Nederland) N. V., has been announced. Tyler formerly was Reed's Pacific Coast Sales division manager in Los Angeles. The new plant is located in the Hague. Tyler has been with Reed since 1940.

•

A. L. (Andy) Almoina has been added to the export office staff of the **George E. Failing Company** in New York City as sales representative. Before joining Failing, Almoina was employed by the City of Miami and later by Westinghouse Air Brake International Company.

•

Carl Joseph Murray has been appointed works manager of the Buffalo, New York, plant of **The Colorado Fuel and Iron Corporation's** Wickwire Spencer Steel division. He has been with Jessop Steel Company, The Crucible Steel Company, and the Lamson Company. The appointment of **Vincent G. Galvin** as superintendent of industrial relations at the Buffalo plant also has been announced. Galvin formerly was a staff member for CF&I's manager of industrial relations. He has been with the company since 1953.

•

Weatherford Oil Tool Company has announced the appointment of **Robert O. Isham** as assistant to the marketing and finance manager. He will establish a formal credit system for the firm. He is a member of the Houston Association of Credit Men.

Modern Swamp Travelers USE . . .

QUALITY Buggies!

4-Wheel Drive • CC Tracks

WE DESIGN AND BUILD SPECIAL MARSH EQUIPMENT

Licensed Manufacturers of Track Type Marsh Buggies

QUALITY BOILER & MACHINE WORKS, INC.

Thibodaux Phone: 5106 - 4137 Louisiana

Arthur L. Reese

Eugene S. Goebel

Motorola Communications Expands Sales Structure

A major expansion of the national sales structure of Motorola Communications and Electronics, Inc., the establishment of four geographical sales divisions and the appointment of six vice presidents, has been announced. In the new alignment, Arthur L. Reese, formerly assistant secretary, was appointed vice president and operations manager.

Eugene S. Goebel, formerly national sales manager, was appointed vice president for market relations, with duties to include public and customer relations.

Four former regional managers in the field, appointed vice presidents in charge of new sales divisions, are Lowell E. White, Eastern division; Homer L. Marrs, Central division; Edward L. Falls, Jr., Southern division; and Donald F. Brickley, Western division.

U. S. Industries Acquires A-1 Bit & Tool Company

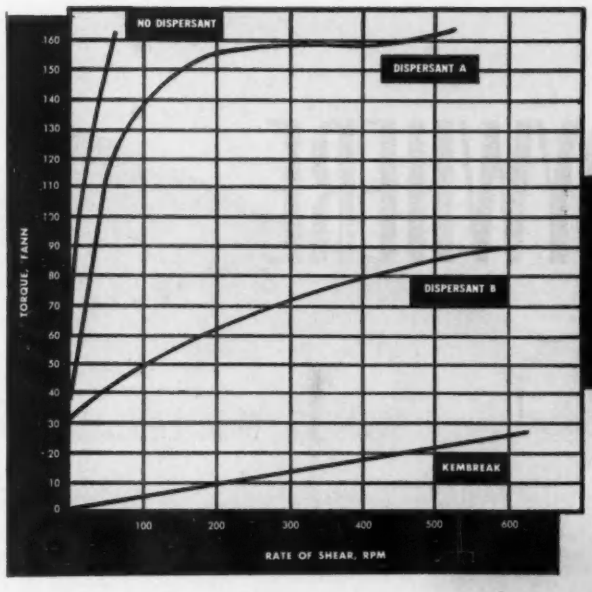
U. S. Industries, Inc. has acquired the assets of A-1 Bit & Tool Company of Houston, Texas, for 34,770 shares of USI's common stock. The tool company, which manufactures a line of special tools and valves used in the drilling and testing of oil wells, will retain its original name but will be operated as a branch of Garrett Oil Tools, Inc., division of U. S. Industries, Inc.

A-1 Bit and Tool, whose main plant is in Houston, Texas, also owns and operates a plant in Tioga, N. D., devoted to maintenance and repair of drilling rigs and fabrication of custom-made items for the drilling industry. Included among the company's products are Hi-Lo Safomatic valves, casing milling tools, casing mills, casing whipstocks, side wall core barrels, circulating heads, check valves and hydraulic feed joints.

At the present time, U. S. Industries manufactures petroleum pumping equipment and allied equipment, including bits and tools, aircraft components, hydraulic and mechanical presses, heavy-duty engine lathes, milling machines, refrigerated farm holding tanks, steel tanks of all sizes for industrial use, electrical conduit fittings and stainless steel cookware.

Stewart & Stevenson Named Greer Hydraulics Distributor

Stewart & Stevenson Distributing Company recently was appointed distributor in Texas and Oklahoma for products manufactured by Greer Hydraulics, Incorporated, Jamaica, N. Y. A complete stock of Greer accumulators and parts will be maintained in the company's warehouse in Houston.



DISPERSION OF SOLIDS IN A LIME TREATED SYSTEM

Inert, Non-Swelling Solids . . 60% by wt.
Dispersant . 3.2 lbs./bbl.
Filtrate Ca^{++} . 750 ppm
NaOH 0

KEMBREAK*
DISPERSES LIME TREATED MUD
. . . even without caustic!

The "mud" used to develop the curves shown here is not one you'd want to use for making hole. But in the laboratory it is one means of demonstrating how well KEMBREAK disperses a mud system having a high calcium ion concentration—without the addition of caustic. And, of course, this dispersant performs equally well in low lime—low caustic drilling fluids and conventional lime base muds.

Furthermore, KEMBREAK muds are virtually unaffected by the contaminants encountered in normal drilling, e.g.: gypsum, anhydrite, cement, salt, lime, limey shales, and clay. KEMBREAK is a stabilizer, too, for oil-in-water emulsions . . . making it doubly useful in lime treated emulsion muds.

Guard against drilling failures, whenever difficult hole conditions are expected, by using muds made with KEMBREAK.

KEMBREAK is a trade name for Marathon Corporation's neutral calcium lignosulfonate. It is the only lignosulfonate product proved by years of successful use in oil well drilling.

KEMBREAK
may be obtained from
MILWHITE MUD SALES CO.
HOUSTON, TEXAS
MAGNET COVE BARIUM CORP.
HOUSTON, TEXAS

*REG. T.M., ACCURACY RIG TOOL CO.

Manufactured by
MARATHON *Corporation*
CHEMICAL SALES DEPARTMENT
ROTHSCHILD • WISCONSIN

EVERYWHERE

in the Oil Fields

Composite Catalog

Busy oilmen throughout the far-flung oil industry keep COMPOSITE CATALOG at their finger tips to make their job easier. It's always on the job, ready for instant reference when fast accurate decisions are to be made—whether buying, specifying or comparing oil field equipment and services.

Here's what you'll find in the new 3-volume edition of COMPOSITE CATALOG:

- 550 Manufacturers and Service Companies, complete or condensed catalogs.
- 3,000 products and services, indexed and cross-indexed.
- 5,392 total pages, containing catalog data on specifications, weights, dimensions, applications you can use right on the job.

For faster, better service in ordering equipment, refer to it by page number in the COMPOSITE CATALOG.

The current 5,392 page edition of the COMPOSITE CATALOG is the world's most complete single source of information on oil field equipment and services. You'll find the new three-volume COMPOSITE CATALOG more valuable than ever before.

The COMPOSITE CATALOG

Published by World Oil

3301 BUFFALO DRIVE **P. O. BOX 2608** **HOUSTON, TEXAS**

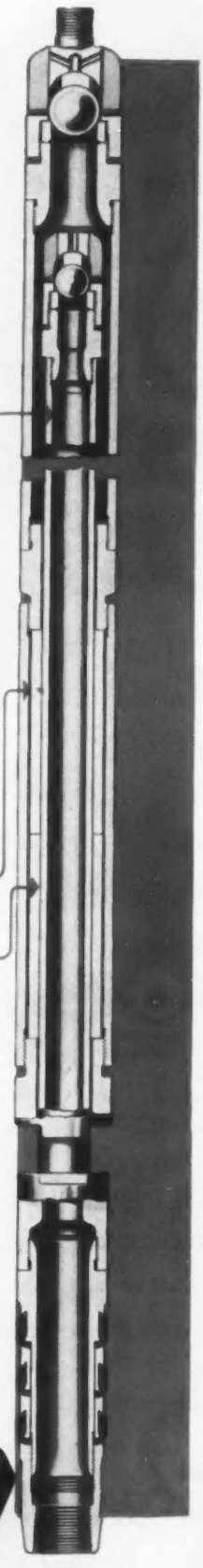
(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Do You have a "Frac" Well that's tough to Pump?

THEN **you should try a Pacific "OIL STATES" rod insert, bottom hole oil well pump...**

WHY? **because the "OIL STATES" is pumping some of the toughest, sandfrac wells in the Mid-Continent fields—from the extreme depths in West Texas and the gulf coast to the shallower zones in Oklahoma, Kansas and Illinois...**

In well after well, oil operators report highly successful pumping with Pacific "Oil States," particularly after trying cup and ring pumps or metal-to-metal pumps with wide tolerances between plungers and tubes. The Pacific "Oil States" offers a new approach to pumping sandy or dirty oil wells. Specifically manufactured to a very close tolerance between plunger and liners, so as to eliminate sand passing between the sealing surfaces which normally cut and score plunger and liners. The Pacific "Oil States" is not merely a "clean-out" pump. It is engineered to pump sand with its "surging action" and further, to pump with a high efficiency made possible only by the close tolerance.



Check these features:

- Furnished with a tolerance between plunger and liners in fits as close as Minus ½ thousandth...
- Furnished in standard steel with stress-proof, heat treated fittings for normal sandy pumping...
- Furnished with stainless steel barrel and parts with "PACILITE" Hard Chrome Plunger for corrosive conditions...
- Furnished in "Stroke-Thru" design to eliminate sticking of plunger and liners in wells that deposit gyp or barium.
- Furnished in pump lengths from 4 feet to 20 feet, with a wide choice of arrangements of valves and fittings...
- Furnished in the following sizes and bores:
  1" and 1¼" for 2" tubing
  1½" and 1¾" for 2½" tubing
  2¼" for 3" tubing
- Plunger and Liners can be "Reground" several times to give the most economical repair costs...

PACIFIC PUMPS INC.

HUNTINGTON PARK, CALIFORNIA

Offices in All Principal cities

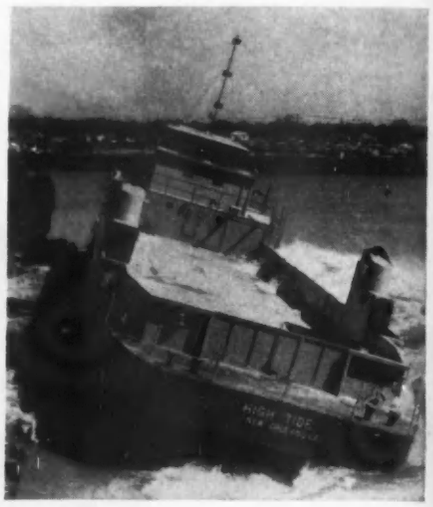
Mid-Continent Division: 1221 East 1st Street, Tulsa, Oklahoma

Export Office: Chanin Bldg., 122 E. 42nd St., New York

ONE OF THE DRESSER INDUSTRIES

PACIFIC®

DW-15



Supply Vessel Launched

The High Tide, a 136-foot offshore supply vessel recently launched at Alexander Shipyards, New Orleans, went on location out of Morgan City, La., for Phillips Petroleum Company. Built for Tidewater Marine Service, Inc., the vessel has 2500 square feet of deck space.

ORRadio Industries to Build Manufacturing Plant in Alabama

ORRadio Industries, Inc., have announced plans for construction of a new plant in Opelika, Ala., designed expressly for the manufacture of magnetic tape. To be the first of its kind in the nation, the one-story brick plant will contain 37,000 square feet of manufacturing area.

The plant, which will increase company production facilities 400 percent, will be located on a 17-acre industrial tract about one mile south of the Alabama city. Construction is expected to be completed by October.

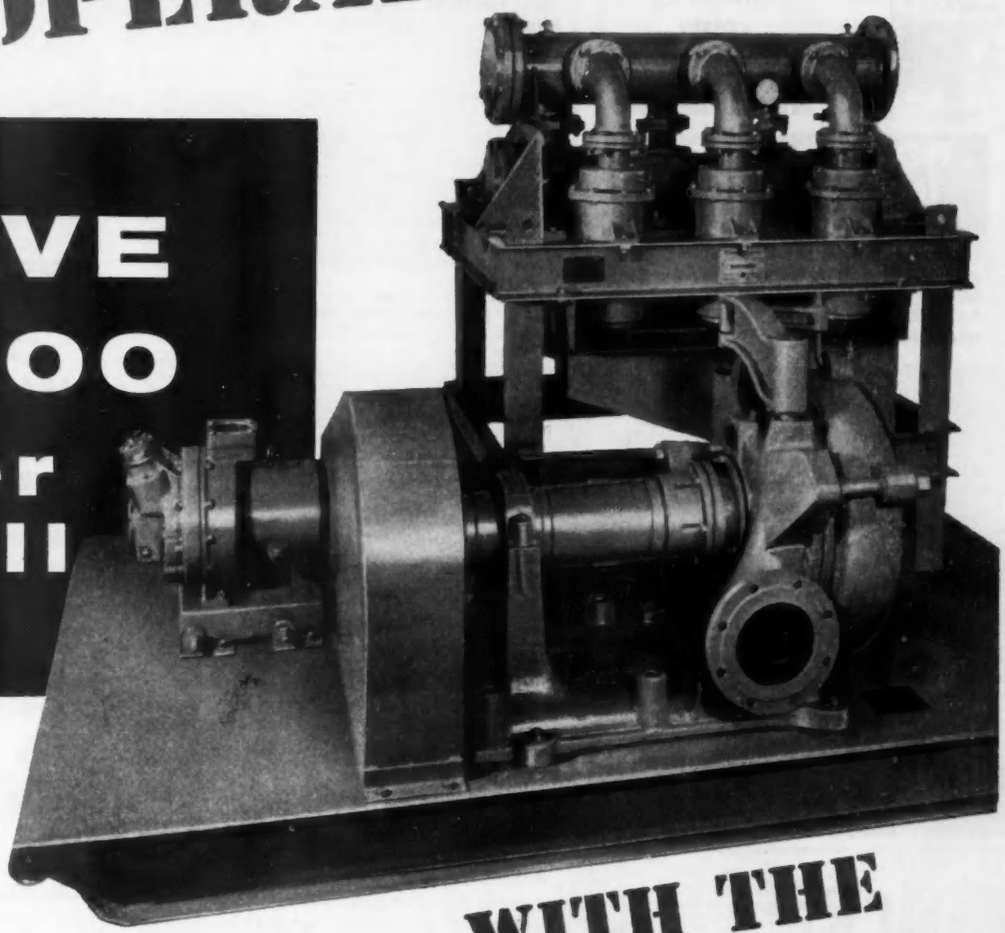
The company manufactures magnetic tape under the trade name of "Irish" brand. A special geophysical office is located in Houston to serve the geophysical industry and instrument manufacturers.

Safety Award Presented

G. O. Griffin (left), general chairman of metals section of the National Safety Council, presents first place safety award to C. E. Jones who accepted it for the New Orleans plant of U.S. Steel Products division, United States Steel Corporation.

RIG OPERATORS...

SAVE $3500 Per Well



WITH THE DORRCO D-SANDER

Sand-free rotary drill mud can mean big dollar savings. A Dorrco D-Sander on your rig will continuously return to the mud pump a mud containing less than 0.2% API sands. Here's what this means in actual savings . . .

★ Drilling and reaming time are reduced.

★ Jet bit performance is increased up to 20% with a corresponding saving in the number of round trips. Conventional bit performance is increased still greater.

★ Slush-pump maintenance costs are drastically reduced. Average life of vital pump parts is increased as much as 400%.

★ Maintenance costs on mud system are greatly reduced as a result of eliminating sand abrasion in mud lines, mud valves, and swivel washpipes.

★ Tank cleaning while drilling fast sandy holes is eliminated.

★ No sand settling in the hole means no sand bridges or tight spots . . . surface pipe runs more easily.

★ Overall rig savings average $3500. per well on existing installations!

DorrClone — T. M. Reg. U. S. Patent Office

For more information on this important development in drilling technique write for a copy of Bulletin No. 2506. U. S. Sales Representative: Salt Water Control, Inc., 1211 Ft. Worth National Bank Building, Ft. Worth, Texas.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

BrakeSol

ELIMINATES COSTLY PARAFFIN REMOVAL METHODS

HOLDS PARAFFIN IN SUSPENSION from FORMATION to REFINERY

BRAKESOL is economical and safe to use, prevents and removes paraffin from the tubing, flow lines, tank bottoms and pipe lines. Effective on both asphalt and mixed-base paraffin.

FOR SERVICE CONTACT YOUR NEAREST BRAKESOL SALES ENGINEER

—EXPORT DISTRIBUTOR—
The National Supply Co
Export Division

CARMI, ILLINOIS 4-2905
CASPER, WYOMING 2-3453
ELLINWOOD, KANSAS 537-R
FT. MORGAN, COLO UNderhill 7-5981
HOUSTON, TEXAS HOmestead 5-6648
LOVINGTON, NEW MEXICO 6-5954
NEW IBERIA, LOUISIANA EMerson 9-3498
ODESSA, TEXAS 2-2575 7-7192
OKLAHOMA CITY, OKLA. VI 3-6629 WH 9-5561

BRAKESOL, Inc.
P.O. Box 9506 Okla. City, Okla.

INCREASE PRODUCTION

CLEAN OUT CHOKING SAND

Excessive sand and sediment holds back your oil. For fast, easy clean out with fewer round trips and less down-time, use world famous Miller Sand Pumps.

SAND PUMP SIZES
O.D.—2½, 3, 3½, 4¼, 5, 5½, 7 In.
Lengths—20, 25, 30 ft.

Composite Catalog, Page 3369

Write for descriptive price list.

MILLER SAND PUMPS

Miller Sand Pump Co.
General Offices, Box 4516
Oklahoma City 9, Okla.

EXPORT OFFICES
30 Rockefeller Plaza
NEW YORK CITY 20, N. Y.

Standard Pipe Supply Forms Standard-Southern Corporation

Standard Pipe Supply Company of Houston has announced acquisition of certain assets of Southern Oilfield Material Company of Beaumont, Dallas and Odessa, Texas, in excess of a million dollars.

Gerald Rauch, president of Standard Pipe Supply Company, and Walter Monroe, Jr., president of Southern Oilfield Material Company, issued a joint statement in which they said the combined operations of both companies would be under the new name of Standard-Southern Corporation. Main offices will be in Houston, a district sales office in Dallas, and warehouses in Beaumont, Houston and Odessa.

The company was founded by Morris Rauch, who presently serves as chairman of the board of directors. Gerald Rauch, president of the new company, announced the election of Walter Monroe, Jr., as a vice president, and the appointment of Thomas F. Hughes as manager of the Beaumont branch and J. Marion Hunter as manager of the Odessa branch.

Drilling Tender "Clayton G. Dorn" Christened at Levingston Yard

Christening ceremonies were held for the Drilling Tender CLAYTON G. DORN recently at Levingston Shipbuilding Company, Orange, Texas. Mrs. Forest D. Dorn, wife of Forest D. Dorn, chairman of the board of Forest Oil Corporation, christened the vessel in honor of the late Clayton G. Dorn, founder of the oil company.

The tender, measuring 260 feet wide, 54 feet long and 13 feet, three inches deep, incorporates the latest safety features and modern equipment necessary for protection and comfort of the drilling crew. It has complete storage facilities for equipment and supplies needed in offshore oil drilling operations.

The $1.5 million vessel was built for the Llano Drilling Company, subsidiary of Forest Oil.

German Steel Tube Firm Opens Office in Houston

A new and enlarged Southwestern headquarters has been opened in Houston by the American Mannex Corporation, general agents in the U. S., Canada and Mexico for Mannesmann A. G. and associated companies. Mannesmann, Germany's largest integrated producer of steel and steel tubular goods, is inventor and developer of the seamless steel tube.

The new office, under the direction of Hans Kayem, manager, will be in the Texas National Bank Building. A sub-office will continue to be operated in Dallas.

The company also announced expansion of its operation to include electric-weld line pipe, from the ultra-modern mill of Mannesmann-Hoesch, in Duisburg, just placed in operation. Soon, too, present production facilities, namely the various works of the Mannesmann Roehrenwerke in Germany, will be supplemented by the new mill of Cia. Siderurgica Mannesmann, Belo Horizonte, Brazil, which will be in full production shortly, and the Mannesmann Tube Company, a new automatic mill in Sault Ste. Marie, Ontario, which will come into full production at the end of 1956.

Proved by USE!

Works in seconds!

Loosens Rusted Bolts
nuts, screws, "frozen" parts
. . . . without breakage!

LIQUID WRENCH

A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

Makes joints LEAKPROOF!

7 BASIC BLENDS

TiteSeal
GASKET & JOINT SEALING COMPOUND

Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

- NON-SOLVENT—WILL NOT HARDEN
- WILL NOT SHRINK, CRACK OR CRUMBLE
- HEATPROOF AND VIBRATION-PROOF

Get them at Industrial or Oil Field Supply Houses.

RADIATOR SPECIALTY CO.
Charlotte, North Carolina

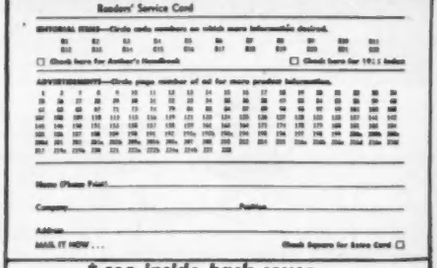
CONTACT YOUR FAVORITE SUPPLY HOUSE

STANDARDIZE ON
PARMACO PRODUCTS
•
THEY SATISFY
•

PARKERSBURG MACHINE CO. PARMACO PARKERSBURG, W. VA. U.S.A.

The House of Courteous Service

use these
READERS' SERVICE CARDS*
for more information



* see inside back cover

These men, past presidents of PESA, and those they are representing have made great contributions to the oil industry. Front row, left to right, are W. L. Childs, Jr., J. A. Crawford, A. W. McKinney, F. M. Mayer, A. G. Evans-Lombe, Rainey Elliott and F. F. Murray. Back row, left to right, are M. E. Montrose, D. D. Bovaird, M. B. Jones, T. Sutter, G. A. Tompson, F. J. Spang, W. D. Wilson, and Wharton Weems.

PESA Honors Past Presidents At Recent Annual Meeting

At its recent 21st annual meeting, the Petroleum Equipment Suppliers Association honored those men who had served as president of the association.

W. L. Childs, Jr., accepted a plaque for his father, W. L. Childs, Reed Roller Bit Company, first president of PESA, 1933-34; J. A. Crawford, Youngstown Steel Products Company of California, was president 1934-35; and A. W. McKinney, National Supply Company, 1948-49. McKinney also accepted a plaque for J. A. Geismar of the same company who was president 1935-36.

F. M. Mayer, Continental Supply Company, president 1951-52, also accepted a plaque for W. J. Morris of the same company, president 1936-37. A. G. Evans-Lombe, Parkersburg Rig & Reel Company, accepted a plaque for J. M. Crawford of the same company, president 1937-38; and Rainey Elliott, Jones & Laughlin Supply Division, current president of PESA, accepted a plaque for J. L. Shakely, formerly of the same company and president 1938-39. F. F. Murray, Oil Well Supply Division, was presented a plaque as president 1942-43.

M. E. Montrose, Hughes Tool Company, president 1955-56, also accepted a plaque for H. H. Glen, Emsco Manufacturing Company, president 1945-47. D. D. Bovaird, Bovaird Supply Company, was president 1953-54; M. B. Jones, The S. M. Jones Company, 1952-53; T. Sutter, Baker Oil Tools, Inc., 1950-51; G. A. Tompson, Bethlehem Supply Company, 1949-50; and F. J. Spang, Spang & Company, 1943-45.

W. D. Wilson, Wilson Supply Company, accepted a plaque for E. W. Gildart, Norvell-Wilder Supply Company, president 1940-41; and Wharton Weems, treasurer of PESA, accepted a plaque for A. B. Judd, formerly of Republic Supply Company, president 1947-48.

Not present at the meeting, but also receiving plaques as past presidents were E. S. Dulin, Byron Jackson Company, president 1939-40; E. W. Miller, formerly with American Iron & Machine Works Company, president 1941-42; and R. S. Durkee, Lane-Wells Company, president 1954-55.

J&L Supply Division Completes Big Spring Store

Jones & Laughlin Supply Division announces completion of a newly-constructed J&L oil field supply store in Big Spring, Texas. The new building, of structural steel exterior, houses two offices at the front and a completely equipped warehouse at the rear. In the center area is an Axelson pump repair shop, with an overhead storage area extending across the offices.

Lee Barrett Herndon is local store manager. Assisting him are Connie V. Hester, Benny D. Willbanks and Clifton O. Wooldridge.

The Big Spring store is under the overall supervision of F. L. McFarland, district sales manager of the firm's West Texas district.

ARCCO

The World Over
wherever there is gas

ARCCO-ANUBIS
'Dry-Air GAS
GRAVITOMETERS

This new Arcco-Anubis Dry Air Gas Gravitometer determines and records specific gravity of gases automatically corrected to the humidity content of the air. The difference in weight between a column of GAS and equal column of DRY AIR is measured. This ratio represents the true specific gravity of the sample.

One bell of the instrument is filled with gas which is being measured, and the other bell is filled with dry air. Otherwise, except for the new instrument having one column for gas and one column for dry air, the unit is identical in operation to the standard gas gravitometer. When calibrated and properly installed, these instruments require little attention other than to wind the clock, ink the pen, and change the chart. Send for bulletin No. 101.

AMERICAN
RECORDING CHART CO.
3113 E. 11th St. • Los Angeles 23, Calif.

Available for Early Delivery

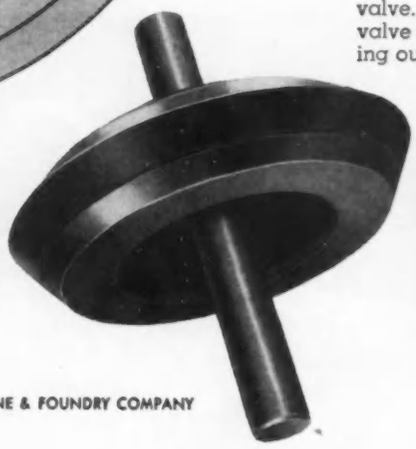
Send for Bulletin 101-R3

For HIGH pump pressures

specify AMERICAN IRON *Hydra-Cushion*

Slush Pump Valves & Seats

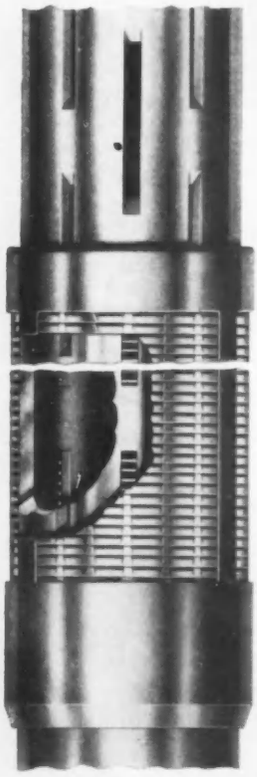
American Iron Hydra-Cushion Valves and Seats operate efficiently at **all** pressures because of the **hydraulic cushion action** of the mushroom on the valve seat and the cylindrical mud chamber of the valve. The trapped mud cushions the shock of the valve on the valve seat, preventing excessive pounding out of valve on seat under high pressure.



AMERICAN IRON & MACHINE WORKS CO. INC. · OKLAHOMA CITY · MANUFACTURERS OF OILFIELD EQUIPMENT

SUBSIDIARY OF AMERICAN MACHINE & FOUNDRY COMPANY

EMSCO SLOTTED . . .



A SUPERIOR SCREEN FURNISHED IN A FULL RANGE OF SLOT GAUGES

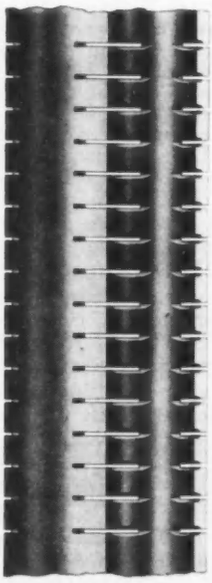
With Emsco, the manufacture of slotted screen pipe is serious business. Our shop is equipped with machines designed especially for this purpose . . . machines that produce high quality slotted screen pipe, with slots ranging from .010 to .100 or larger if required.

We're proud of our facilities for producing this full range of slotted pipe. We're proud, also, of the record established by Emsco Slotted Pipe in wells all over the world. It retains from 80% to 85% of the original collapse strength of the pipe . . . it may be spudded or rotated reasonably without damage . . . may be easily cut and pulled . . . and its V-shaped slots provide maximum drainage with minimum clogging. It's furnished, of course, in all popular sizes of pipe, to lengths as specified.

• • • •

Emsco also manufactures "Vertical Slotted" Wire Wrapped Screen, with slotted openings that stay open longer, provide more drainage area per foot and retain 25% more strength than pipe with drilled holes with equal area.

For full information on Emsco "Slotted" and "Wire Wrapped" Screen Pipe, write for a copy of our latest catalog.



For Oil, Gas or Water Wells

EMSCO SCREEN PIPE COMPANY

2219 BROOKS STREET **Phone CApitol 7-6346** **HOUSTON, TEXAS**

Export Representative: Val R. Wittich, Inc., 30 Rockefeller Plaza, New York 20, N. Y.

Sales Meeting Held

Group of Bethlehem Supply Company representatives inspect general power pumps in the Tulsa Plant test laboratory during the first of two recent annual company sales meetings. A total of 113 out-of-town personnel attended, including district managers, machinery sales representatives and store managers from all 71 Bethlehem stores and offices. The meetings were held primarily for discussion on the Bethlehem line of general service pumps, including engineering design and field application.

Kirk and Overly Form Macco Gas Lift Company

Formation of the Macco Gas Lift Company in Odessa has been announced by Rufus Kirk and James A. Overly. The company was organized to handle sales and service of Macco gas lift valves. Territory covered by the firm includes all of West Texas and New Mexico.

Manufacturer of the line is Macco Oil Tools, Inc., of Houston, pioneer in the development of fluid operated gas lift valves.

Kirk is a former president of MWL Tool and Supply Company in Midland; Overly was general manager.

Republic Supply Announces Opening of Louisiana Store

The Republic Supply Company has opened a new store at Morgan City, La. Roscoe Burks will be district manager, with offices in New Orleans, and J. A. Kenner has been named store manager. The location is headquarters for much of the offshore drilling in the Louisiana coastal waters.

Vapor Recovery Systems Establishes Houston Branch

Ray V. Long, formerly with the Sales department of the factory, will be district manager of Vapor Recovery Systems Company's direct factory branch recently opened in Houston. Offices are in the M & M Building. George W. Noyes will assist Long in sales engineering and service.

WORLD OIL'S Trading Post CLASSIFIED ADVERTISING

RATES: Regular Classified (undisplayed) set in this size type: 12 cents per word. Minimum charge, $3. Blind box address in our care counts six words. Replies forwarded without charge. **Situation wanted ads,** 6 cents per word. **Display ads,** set in suitably larger type with ruled border, $12 per column inch; situation wanted display ads, $6 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. **All classified ads payable in advance. COPY DEADLINE:** 17th of month preceding date of issue. Send copy and checks to: **Trading Post Section, World Oil, P. O. Box 2608, Houston, Texas.**

HELP WANTED

■ EXPERIENCED Petroleum Engineer. A technically trained and experienced petroleum engineer is needed for unit operations. Must be a graduate petroleum engineer with several years in actual field operations in addition to general petroleum engineering experience. Anyone interested, with these qualifications, please reply to Box 95-W, WORLD OIL, Houston, Texas.

■ OPPORTUNITY IN AIR DRILLING for engineer with sales inclinations to get in on ground floor of air drilling of oil and gas wells. Old, established compressor manufacturer, already recognized for pioneering in air drilling, needs man to head up sales and engineering program. REQUIREMENTS: 1—Enthusiastically believe in future of air drilling. 2—Petroleum or mechanical engineer that knows drilling procedures. 3—Preferably, known in trade, although not necessary. 4—Must be interested in traveling, although home base might well be in Middlewest or Southwest with only occasional visits to Plant and Engineering Department in East. Interviews will be arranged from written applications mailed to Box 98-W, WORLD OIL, Houston, Texas.

Petroleum Engineering Graduate

Preferably with some oil field experience in the Southwest who may be interested in reservoir study, pressure maintenance, water flooding, gas repressuring, field supervision, core analysis, and appraisal work in conjunction with our small well established consulting petroleum engineering firm in North Texas. Adequate compensation with advancement. Include personal data, snap shot, oil field experience, scholastic standing, when available, martial status, draft or service prospect, etc. in your letter to Box 97-W, c/o WORLD OIL, Houston, Texas.

Petroleum Engineers
(SOUTH AMERICA)

Graduate engineers with experience in drilling, production, reservoir and equipment. Working knowledge of Spanish desirable but not essential.

Lubrication Engineers
(WEST AFRICA)

Mechanical Engineer's degree and experience in lubrication and petroleum products. Fluent French not essential but working knowledge desirable.

Operations Supervisor
(WEST AFRICA)

Experienced all phases construction engineering concerning marketing petroleum products, i.e., appropriations, terminal layout and maintenance. M.E. or C.E. degree desirable but not essential. Working knowledge French essential.

Liberal Employe Benefit Plans
Salary commensurate with experience

Forward resume of education and experience to

THE TEXAS COMPANY
Foreign Personnel Office
135 East 42nd Street
New York 17, N. Y.

HELP WANTED

■ WANTED: Man for teaching staff and part-time research in Petroleum Engineering at Rocky Mountain School. Should have M. S. or better and some oil industry experience. Salary open. Reply to Box 100-W, WORLD OIL, Houston, Texas.

SITUATIONS WANTED

GEOLOGIST

Gulf Coast experience, consulting in Houston, Texas, wants firm connection with independent oil operator or drilling contractor to drill prospects. Equitable basis. Write Box 99-W, WORLD OIL, Houston, Texas.

INDEPENDENT POWER COST SPECIALIST wants consultation work anywhere to assure electricity being purchased on lowest basis possible. 10% reduction in power costs not unusual in oil industry. Luther W. Davis, Box 2762, Dallas, Texas.

FOR SALE EQUIPMENT

ZIPPO. **WINDPROOF LIGHTERS THE PROBLEM SOLVER!**
ADVERTISING? GIFTS? INCENTIVES? RECOGNITION?
See our new Gold Filled, Silver Filled and Desk Models
Call: BOB ELLIOTT
2414 W. Holcombe MA-3-9668 Houston 25, Texas

BUSINESS SERVICE

■ **Delaware Corporations formed and serviced** Inquire without obligation. **American Guaranty & Trust Company, 910 West Street, Wilmington, Delaware.**

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628 — Hobbs, New Mexico — Phone 3-3141
146 Allen Building — Midland, Texas — Phone 2-2962

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Here's the Fast Safe Way to Guy Rigs and Derricks

Chance Plate Anchors are the most efficient anchors made for permanent derricks and heavy drilling rigs. They can be installed in a fraction of the time required for burying old pipe or setting concrete blocks and they *anchor* through solid earth. They do not rely on back-filled earth for holding power. The reinforced steel plate withstands exceptional pulling strain without distortion. Holds up to 50,000 pounds in hard ground.

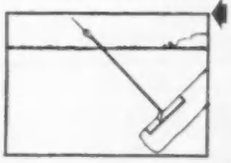


Plate Anchor Installed

Send for your catalog of Chance Earth Anchors for the Oil Industry.

A·B·CHANCE CO·
CENTRALIA, MISSOURI
TORONTO, ONTARIO, CANADA

SQUEAKS from the BULLWHEEL

Justice

The defense attorney for a man charged with first degree murder knew he didn't have much of a defense. So, he contrived to bribe one of the jurors, offering him $1000 if the defendant got off with manslaughter.

The case went to the jury which deliberated many hours, finally returning the verdict of manslaughter.

When the defense attorney paid off, the juror remarked: "It wasn't easy. The rest of the jurors wanted to acquit him, but I held out.

•

Exasperation

A man was attempting to explain the basic facts of dog racing to his wife.

"There's one thing I don't understand," the wife said. "What causes the dogs to run around the track at top speed?"

"They're chasing a mechanical rabbit," her husband explained.

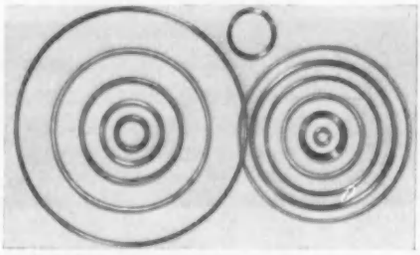
"You'll think this is a silly question," the wife said, "but now I'd like to know what the mechanical rabbit is chasing?"

"A mechanical carrot," was her exasperated husband's reply.

WORLD OIL

"We think it'll revolutionize the drilling industry for close spaced holes."

Need RING GASKETS?



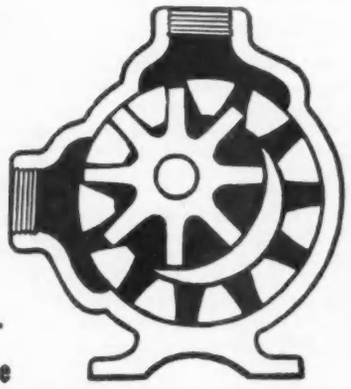
Call CHICAGO-WILCOX for PROMPT SERVICE

Since 1906, Chicago-Wilcox has served the refining industry with gaskets for every requirement. These A.P.I. ring gaskets are typical. Used on ring-type flanged joints in high pressure lines. Made of soft iron, standard steel alloys or any of the non-ferrous metals to any desired cross section.

Send specifications for quotations and prompt-delivery schedule.

CHICAGO-WILCOX MFG. CO.
7709 Avalon Avenue, Chicago 19, Ill.
Phone: SAginaw 1-1900

VIKING ROTARY PUMPS



• Cut-Away View Showing Viking's Gear-Within-A-Gear Principle

The unique and unusually simple construction of Viking Pumps . . . with only two moving parts . . . assures you of long, easy-maintenance operation with all grit-free liquids.

Let Southern Engine & Pump Company show you how Viking Pumps can solve your pumping problems. We invite your inquiries.

Distributors

SOUTHERN ENGINE & PUMP COMPANY

MANUFACTURERS • MACHINERY FACTORS • CONTRACTORS
Service Facilities at: Houston – Dallas – Kilgore – San Antonio – Edinburg
Corpus Christi and Beaumont, Texas.

Over
60
Locations in the United States and Canada

McCullough® REPORTS TO THE OIL INDUSTRY

Service
Anywhere Anytime

New Services • • • New Tools • • • New Methods • • • Outstanding Results

McCullough Log Finds an Oil Well Where Dry Hole Was Expected

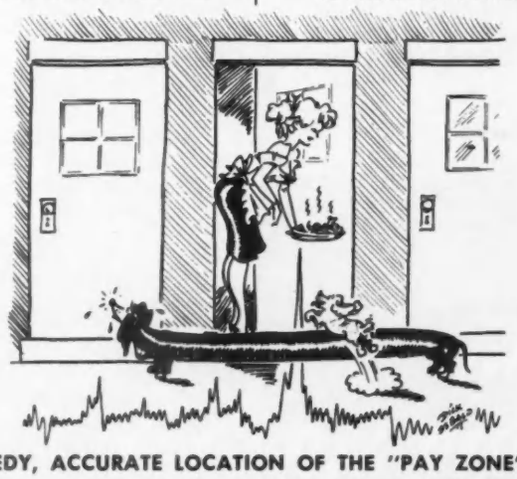
An electric log, run in this semi-wild cat well in Oklahoma, showed a little less than nine feet of possible pay with a small shale break in the center. This was followed by a micro-log which showed very poor permeability in both sections of the sand. From these findings the operator expected a dry hole.

However, a McCullough Radiation Well Log was run, obtaining Gamma Ray and Neutron Curves and recording a simultaneous collar log. The Gamma Ray-Neutron curves accurately located and defined 12 feet of pay sand with two feet of shale in the middle and showed both sections of the sand to be porous.

The well was perforated from logging measurements in a single run by McCullough Super Casing Glass Jets in a Steel Strip Carrier with the two foot shale section blanked off. Thirty-six holes, four per foot, were fired in the two sands.

After perforating, the Steel Strip Carrier was pulled and a bailer was run in the hole. Returns were mud cut oil. Bailer was again run after a 20 minute wait and fluid level had risen 225 feet.

Because of the accurate, reliable information provided by McCullough's Radiation Well Logger, this well proved a valuable extension to an established field.



SPEEDY, ACCURATE LOCATION OF THE "PAY ZONE"!

. . . and in radioactivity well logging, McCullough's short, efficient scintillation counter fully evaluates ALL zones—thick or thin—locates "pay zone" accurately. A longer, less efficient counter may not provide sufficient data to clearly locate and define areas of interest.

Wild Well Killed With Aid of McCullough Radiation Logger

15 Million Cubic Feet Wild Gasser—Burning—Killed After McCullough Gamma Ray-Neutron Log Locates Gas Zone

Accurate, reliable down-hole information provided by McCullough Gamma Ray—Neutron curves located and defined the gas sand responsible for this wild blow-out. The presence of this sand had not been indicated by a previous electric log nor by the drilling log.

The well blew wild on January 16th, burning approximately 15,000,000 cubic feet of gas daily. Numerous attempts, by experts, to kill the well were unsuccessful.

A directional relief well was drilled to 2800′ and cased with 7″ O.D. 23 lb. cemented pipe. Water flood operations were started and about 250,000 barrels of water were injected into the formation suspected of being the cause of the blow-out and fire. Flooding efforts at this depth proved futile. There was no reduction in the volume of gas flow.

McCullough ran a radioactivity log in the relief well and the Gamma Ray and Neutron curves definitely established a substantial gas sand at approximately 2600′, considerably higher than the previously suspected formation. This sand had been completely missed by both electric and drilling logs.

A Bridge Plug was set below the newly discovered sand, cement was dumped on the plug and the zone was perforated by McCullough M-3 Bullet Guns.

Water injection procedure was again started. Five days after the discovery of the new zone, gas flow was reduced to a point where the flame was extinguished and the well brought under control. Another tribute to the efficiency of McCullough's Radiation Well Logger.

McCullough® TOOL COMPANY

Cable Address: MACTOOL

LOS ANGELES
HOUSTON
EDMONTON

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

SECONDARY RECOVERY
CABLE ENGINEERING
TECHNICAL CONSULTING
PRODUCTION ENGINEERING
SERVICE, INCLUDING
CORE ANALYSIS

PRESSURE MAINTENANCE WITH GAS OR WATER

WE TRACK DOWN EVERY FACT

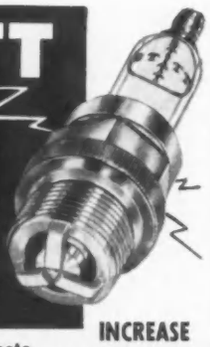
. . . to maintain our consistently fine record of accurate oil reserve estimates.

REPRESSURING WITH GAS OR WATER

SURVEYS
ESTIMATES
DESIGN
INSTALLATION
SUPERVISION

PETROLEUM ENGINEERS
CABLE ENGINEERING
WICHITA FALLS, TEXAS

STITT
NEW triple ignitor SPARK PLUGS



INCREASE MAGNETO LIFE

Save on costly magneto overhauls—cut engine "down" time substantially. Stitts last up to 10 times longer—require fewer changes—reduce wear. It's not the plug price, but the "change cost" that's important. Stitts cost a little more—save hundreds of dollars per engine per year. Factory equipment in Clark, Cooper-Bessemer, Worthington, other leading engines.

Write for Field Test Reports
Free $1 Gap Gauge

STITT Ignition Company
Columbus 1, Ohio

Get STITTS From:

BELL ENGINE SERVICE	JNO. MULLER CO.
BETHLEHEM SUPPLY CO.	REAGAN EQUIPMENT CO.
CLARK BROS. CO.	WAUKESHA ENGINE & EQPT. CO.
COOPER-BESSEMER CORP.	WAUKESHA-PACIFIC
HOPEMAN EQUIPMENT CO.	WAUKESHA SALES & SERVICE Inc.
INGERSOLL-RAND CO.	WORTHINGTON CORP.
MAGNETO IGNITION SERVICE	R. ANGUS (ALBERTA) Ltd. CAN.

and Supply Stores Everywhere.

"Does this mean you do not wish to discuss the matter further?"

Some Pill

A woman whose doctor had prescribed one of the new tranquilizing drugs for her was telling a man about it at a party.

"I take one pill a day," she said. "It soothes me, chases all the jitters away, improves my appetite and makes me really feel like living."

The man shook his head in wonder, then turned to the other guests and shouted: "Hey, gang, guess what they've got on the market now? Instant martinis!"

•

Ruined the Curve

"You can't beat the system," moaned the student after getting his grades. "I took basket weaving for a crip course but two Navajos enrolled and raised the curve so I flunked."

•

Couldn't Afford It

Wife: "What do you mean by coming home half drunk?"

Husband: "It's not my fault. I ran out of money."

•

Habit

Wife: "You were right, Henry, and I was wrong."

Henry: "Forgive me, dear."

No Use Waiting

Every chair in the doctor's office was taken. Some of the patients talked awhile and then silence fell. Finally one old man stood up wearily and said, "Guess I'll just go home and die a natural death."

•

No Cause

The wife of a farmer, whose farm was isolated in the back mountain country, went out of her mind. The attendants of a mental hospital were forced to place her in a strait jacket in order to get her in the ambulance for the trip to the institution. Her husband stood around distraught. As the woman was being placed in the car, the doctor went over to talk to him to get some facts in the case.

"I can't understand what could have gone wrong with that woman," said the husband. "She ain't even been out of the kitchen in 30 years."

•

Deduction

"My wife spends too much, nags me consistently, is very untidy and doesn't understand me."

"Really? When did you meet this other woman?"

•

Same Thing

"I'll bet if I were married I'd be the boss and tell the wife where to head in."

"Sure! And I'll bet when you meet a train, you honk your horn and it gets right out of the way, doesn't it?"

•

Not Contagious

Schoolboy: "You should come up to our house and see our new baby."

Teacher: "Thanks, but I guess I'd better wait until your mother has recovered."

Schoolboy: "Aw, you needn't be scared. It ain't catching."

•

Let's Get This Straight

A little fellow who had just been spanked turned to his mother and asked: "Mother, did grandfather spank father, when he was little?"

"Yes, certainly he did."

"And did his father spank him?"

"Yes."

"And did his father spank him?"

"Yes."

"Well, who in the hell started this, anyway?"

STEEL BARGES

Thomas Jordan, Inc.

New Orleans, La. • CAnal 4391

Night • WA 0918·W • VE 5·0826 • AU 2382

TEM-PLUG

"protects the pay"

- in selective acidizing
- in multiple fracturing . . . and
- preventing loss of clean-out and completion fluids

with

OIL SOLUBLE ACTION!

Available through your local mud and service companies

CHE[illegible] Inc.

HOM[illegible] OMA

You can save from ½ to ⅔ the cost of a new gauge, or instrument, by using our complete overhaul and repair service. Quality, guaranteed work. Fast service.

TULSA GAUGE
AND
INSTRUMENT CO.
1133 N. UTICA • TULSA, OKLA.

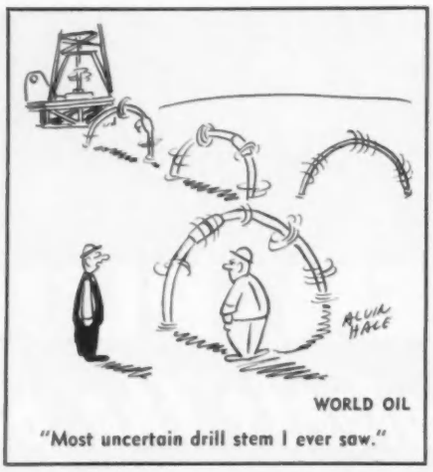
Principles of editorial policies

Free to World Oil Subscribers

Have you considered writing articles for WORLD OIL or the other technical press? If so, send for our valuable booklet the *Authors' Handbook*. It aids non-professional writers to prepare articles for publication, also offers suggestions on making presentation reports, or papers for meetings.

Turn to the blue Readers' Service card inside the back cover of this issue of World Oil and mark the space that is titled: "Check here for Author's Handbook." It is a convenient, easy way for you to get a copy. No postage necessary—no obligation.

World Oil Editorial Dept.
P. O. Box 2608 - Houston, Texas, U. S. A.



"Most uncertain drill stem I ever saw."

That's Life

Many a man works hard to keep the wolf from his door. Then his daughter grows up and brings one right into the house.

•

Specialization

Customer: "Waiter, could you tell me if it's raining outside?"

Waiter: "Sorry, sir, this isn't my table."

•

About Right

"I read about a man who speaks eight languages who married a woman who speaks four."

"That seems to be about the right handicap."

•

Motto

Keep smiling except when the victim is relating the details of an unhappy love affair or an unfortunate speculation.

•

All Alike

The dear old lady was introducing the new deacon to her husband, who was a little deaf and a Republican.

"Dear, this is the new deacon."

"New Dealer?" said the deaf husband.

"No, dear, not new dealer. New deacon, new deacon. He's the son of the bishop."

"They all are," replied the husband.

•

Good Excuse

Two men, fishing on a Sunday morning, were feeling pretty guilty. One said to the other: "I suppose we should have stayed home and gone to church." To which the other replied lazily, "Heck, I couldn't have gone to church anyway. My wife's sick in bed."

•

Pretty Potent

"In this bottle I have peroxide which makes blonds, and in this bottle I have dye which makes brunettes."

"And what's in the third bottle?"

"Gin, which makes both."

•

Half Dead Anyway

Minister: "Really, my dear, you should wait more than two months after your husband's death before marrying again."

Young widow: "Yes, but you forgot, Reverend, that he was completely paralyzed for eight months before he died."

COMPLETE
production testing
AND
wireline service
☆
SOUTHERN ENGINEERING SERVICE
P. O. Box 4296, Corpus Christi, Texas
phones
G. W. TAYLOR
JNO. D. BERRY
TU-3-1138
LEROY LANE
UL-2-5786

GUNITE
Since 1915
CONCRETE
SAND AND CEMENT
"Placed by Air"

We have the equipment, personnel and experience to complete any and all GUNITE work regardless of size or location.

Send for specifications and bulletins

GUNITE CONCRETE & CONST. CO.
1301 WOODSWETHER RD., KANSAS CITY 5, MO.
2016 WEST WALNUT, CHICAGO 12, ILLINOIS
3206 HOUSTON, HOUSTON 9, TEXAS
3545 LINDELL BLVD., ST. LOUIS 3, MO.
Milwaukee and Twin Cities—Denver New Orleans

core barrels
bits
washover shoes
contract diamond coring
sales and service

DIAMOND BIT & CORING CO.
609 E. Mistletoe Phone HI 3-9212
Home Office
VICTORIA, TEXAS
Jake McCallister, Pres.
Branch Office
LULING, TEXAS
Phone 1020

Hydrocarbon
WELL LOGGING
DOMESTIC and FOREIGN
C E C
CARAN
ENGINEERING CORPORATION
Milam Bldg. • San Antonio
Branch Offices: HOUSTON and ALICE, TEXAS

AS A STANDARD OF COMPARISON THE WORLD OVER!

The Dresser *Plus* + is more than a catch phrase. It's the personification of the basic business operating philosophy of independently-managed Dresser companies. The Dresser *Plus* + is another way of saying "teamwork." It's your assurance of a reputable world-wide source of equipment and technical services for the oil, gas, chemical and electronic industries.

DRESSER INDUSTRIES, INC.

As needed, the resources of the Dresser companies can be meshed together in a smoothly operating mechanism. In such cases, the specialized experience and facilities of each division are combined to bring about unified action. This Dresser *Plus* + service is readily available from Dresser offices and representatives in the United States and 98 foreign locations.

Geared together by Dresser Industries, Inc., these many diversified though allied facilities assure highly successful performance...make Dresser products and technical services for the oil, gas, chemical and electronic industries the standard of comparison the world over. DRESSER INDUSTRIES, INC., home office in the United States, Republic National Bank Building, Dallas 21, Texas.

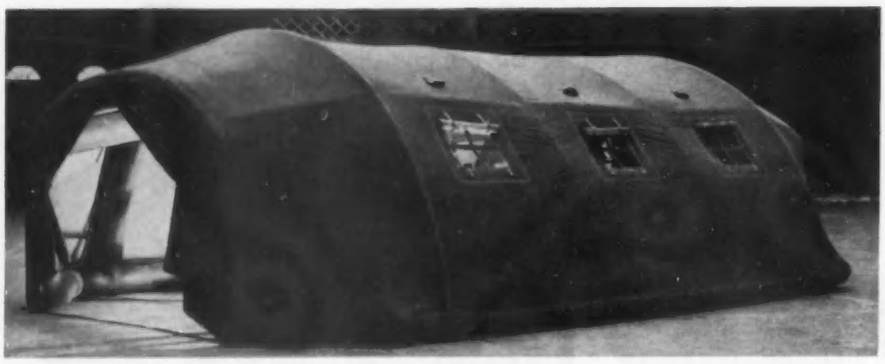
Tomorrow's Progress Planned Today

TO MAINTAIN CLOSE PERSONAL CONTACT WITH OUR CUSTOMERS, DRESSER OPERATES WORLD WIDE

CLARK BROS. CO. London, England	CLARK COMPRESSOR CO., LTD. Calgary, Alberta, Canada	CLARK-ITALY, S.p.A. Rome and Milan, Italy	CLARK BROS. PAN AMERICAN, INC. Buenos Aires, Argentina; Mexico City, D.F. and Caracas, Venezuela	DRESSER A.G. Zurich, Switzerland Caracas, Venezuela
DRESSER MANUFACTURING COMPANY, LIMITED Toronto, Ontario, Canada	DRESSER MANUFACTURES (ENGLAND) LIMITED London, England	INTERNATIONAL DRESSER EQUIPMENT COMPANY Caracas, Venezuela and Buenos Aires, Argentina	LANE-WELLS CANADIAN COMPANY Edmonton, Alberta, Canada	MAGNET COVE BARIUM CORPORATION, LTD. Calgary, Alberta, Canada
MAGCOBAR DE MEXICO, S.A. Monterrey, N.L., Mexico	PACIFIC PUMPS OF CANADA, LTD. Edmonton, Alberta, Canada	PETRO-TECH SERVICE CO. Caracas, Venezuela	ROOTS-CONNERSVILLE BLOWER (CANADA) LTD. Toronto, Ontario, Canada	SECURITY ENGINEERING CANADA, LIMITED Edmonton, Alberta, Canada

What's New In Equipment

Drilling • Production • Exploration



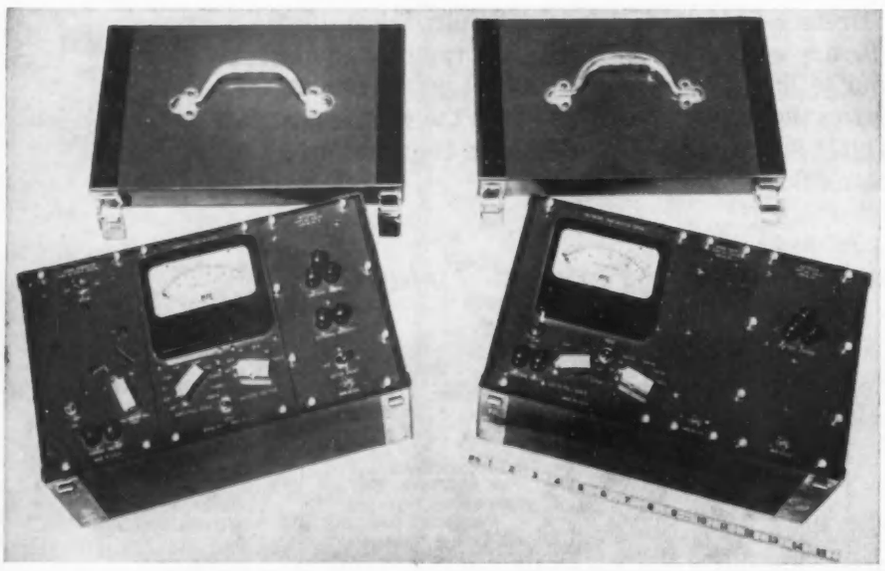
Inflatable Hut

Elliot Equipment Limited is sole manufacturer of a low pressure, inflatable hut which can be erected by one man on any ground in less than three minutes. With a clear floor space of 30 feet by 19 feet, the hut provides sleeping accommodations for 30.

The main structure consists of an inflatable low pressure framework with a rubberized fabric covering. The floor, also of rubberized fabric, is detachable, and the weatherproof plastic windows can be opened easily. Zippered doors at each end can be opened or closed from either side. Electric light and telephone fittings are provided, and heating by paraffin stoves presents no problem. Ventilation is provided by six louvres.

When packed, the hut measures 4½ feet by 18 inches. It weighs 100 pounds. No poles are required. Completely weatherproof, the outer covering is not affected by ice or frost and snow does not settle on it. It dries within minutes even after the heaviest rain.

For more data, circle **No. E1** on Reader's Service Card, last page this issue.



Resistivity System

Houston Technical Laboratories offers a new resistivity system, compact in design and simple to operate, which provides a fast and economical means of locating mineral deposits and geological structures.

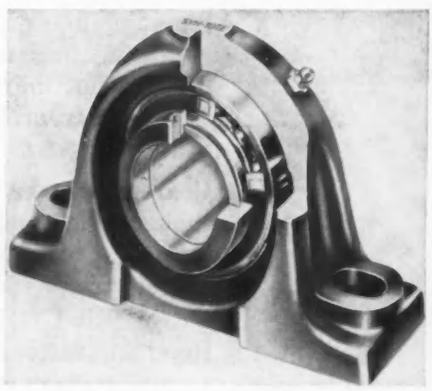
The electrical resistivity method of prospecting is concerned with locating abrupt changes in a vertical plane in the earth's resistance. The method is useful in locating sulfide ores, water, geologic faults and other anomalies characterized by abrupt changes in electrical resistance. The HTL system, which consists of two separate pieces of equipment, the signal generator bank and the voltmeter bank, is designed for use with the Wenner electrode configuration.

The determination of ground resistivity requires the measurement of a length, a current and a potential. Four electrodes are placed in the ground at equal intervals in a straight line. The signal generator bank provides a ten-cycle square wave voltage which is applied to the two outer (current) electrodes. The voltmeter bank is a potential measuring device and is connected to the two inner (potential) electrodes. Simultaneous observation of current and potential enables the resistivity for a particular electrode-separation to be calculated.

The HTL system also is adaptable for use with the Lee Configuration which employs two current electrodes and three potential electrodes.

In the photograph, the signal generator bank is on the left; the voltmeter bank on the right.

For more data, circle **No. E2** on Reader's Service Card, last page this issue.



Positive-Seal Bearing Mount

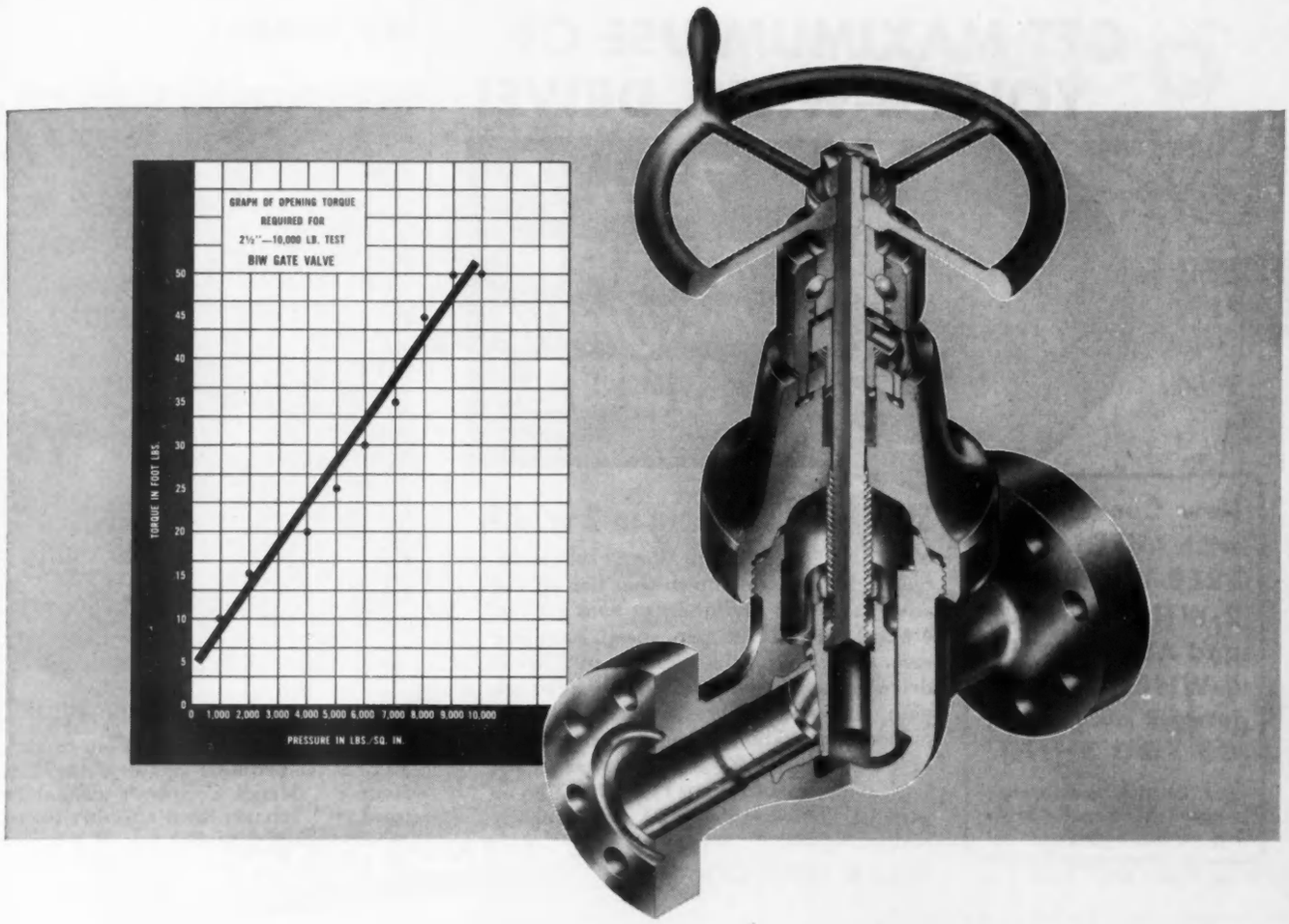
A new unit pillow block and unit flanged mounting for anti-friction bearings have been added to the SKF Industries, Inc., line of bearing mounts.

Known as the Type SYH-X Unit Pillow Block and Type FY-X Unit Flanged Mounting, the new units are of the eccentric lock type, extending use of the positive seal mounts to applications where an eccentric lock is desired. The SYH-X also has a reduced center height to permit use where space is limited.

The bearing mounts incorporate all special design features of the company's unit pillow blocks and unit flanged mountings, including positive sealing through use of a duPont washer to retain lubricant; an external rotating flinger to keep out dirt; a spherical outer ring to compensate for initial misalignment; and a convenient re-lubrication fitting.

For more data, circle **No. E3** on Reader's Service Card, last page this issue.

Save time! Keep informed! Circle numbers on Readers' Service Cards, last page this issue



BIW NON-LUBRICATED GATE VALVE

Opens and Closes Easily UNDER PRESSURE

Look at this graph showing the low torque necessary to open or close under pressure. Here is a truly easy to operate valve. And because no lubricant is required, the BIW Non-Lubricated Gate Valve is always ready to open or to seal tightly. The metal-to-metal seal — proved in more than 35,000 BIW valves in the field — holds tight. Once in, you can forget it. No man-hours wasted on lubrication. Simplified design for years of service without trouble. Have your BIW man show you the complete BIW Christmas tree with the proved BIW Non-Lubricated Gate Valves. *Oil tool sales office: 1404 Dunlavy, Houston 19, Texas.*

ALCO

ALCO PRODUCTS, INC.

New York

Sales Offices in Principal Cities

GET MAXIMUM USE OF YOUR 4-WHEEL DRIVE!

New! **WARN LOCKOMATIC HUBS**

New Convenience with AUTOMATIC FREE-WHEELING 2-WHEEL DRIVE and AUTOMATIC 4-WHEEL DRIVE forward and reverse AS YOU SHIFT!

Plus "Locking" controls for 4-wheel drive engine braking control safety.

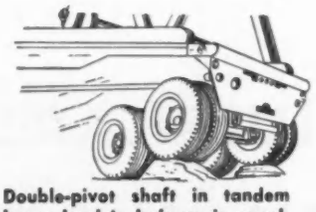
Over 75,000 Warn Hubs in use

Stop front-end drag in 2 w. d.!

Your 4-wheel drive with Warn Hubs is the *only* vehicle you can own that has *all* the advantages and usefulness of *both* a 2 and 4-wheel drive. It has pep, speed, handling ease, economy on the highway in 2-wheel drive—and full-power traction in the rough going in 4-wheel drive. You save on equipment and operation. You get maximum use of your vehicle. Your dealer has Warn Lock-o-matic or Locking Hubs. See him or write us. Willys models sold exclusively by Willys dealers.

WARN MFG. CO. Seattle-88, Washington
Riverton, Box 6064-WO6

SMOOTH RIDES IN THE *ROUGH*



Double-pivot shaft in tandem keeps load in balance in rough areas, guarantees load equalization between axles, reduces wear on tires.

Exclusive hi-tensile, pressed-steel frame with angle truss brace permits heavier loads.

Look to Loadcraft for dependability in meeting your oil field transportation requirements. Since the first pole trailer was built 40 years ago by Fred Spencer, trailer manufacturers have attempted to duplicate Spencer quality. Pulls easier because of Spencer True-Beam Axle with machined-in camber, for correct toe-in, maximum tire life. Optional rolling tail pipe for rear loading has self-aligning roller bearings in each end. Find out for yourself that a Spencer Trailer is a quality trailer.

Choose from a complete line of Pole and Pipeline Trailers, as well as tandem or single-axle, semi-floats, or low-beds.

WRITE FOR LITERATURE

Spencer-Safford **LOADCRAFT**
AUGUSTA, KANSAS

NEW EQUIPMENT . . .

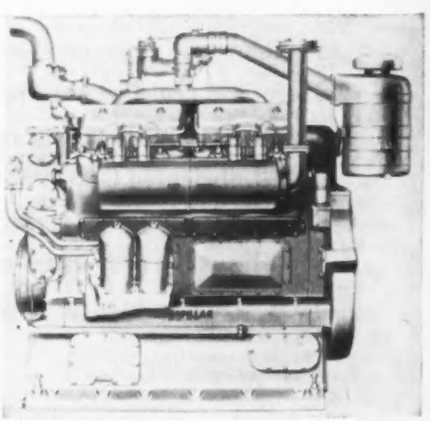
Shear Leg Derrick

Designed to meet the special requirements of the petroleum industry, American Hoist and Derrick Company's giant shear leg derrick recently lifted a world's record weight in a load of 800 tons in a test in the Gulf of Mexico. The machine was designed to handle the massive upper portions of offshore drilling platforms in a single lift.

Stationed on the stern of a barge, 90 by 300 feet, the 240-foot high derrick can be dismantled or erected in a relatively short time. When completely rigged, it requires nine miles of wire rope up to 2½ inches in diameter.

(This item supplements American Hoist and Derrick Company data on Page 2885 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E4** on Reader's Service Card, last page this issue.



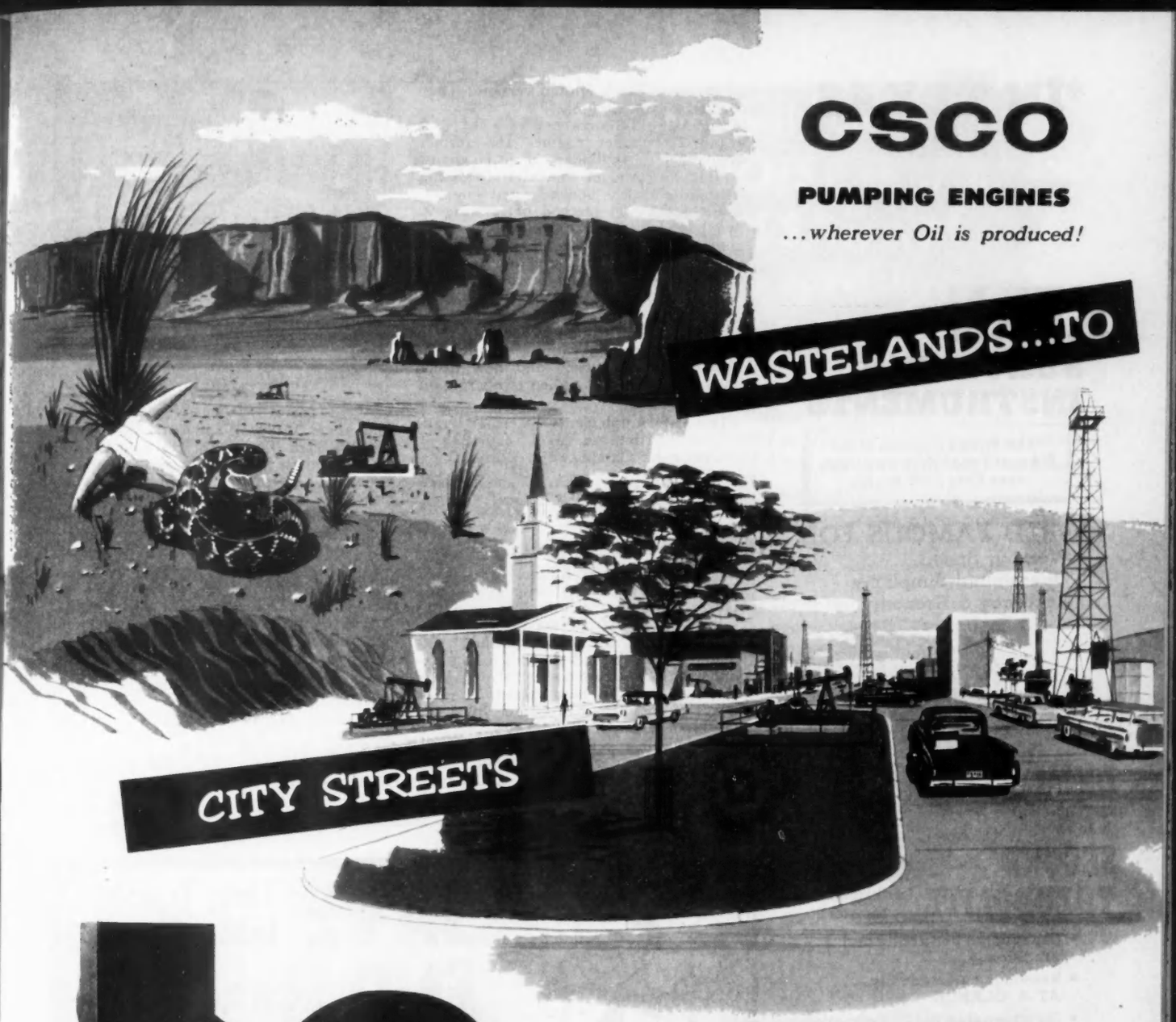
V-Type Engines

Two heavy-duty V-type engines have been announced by Caterpillar Tractor Company. Capable of producing up to 650 horsepower, the new units are available in turbocharged, roots-blown, naturally

CSCO

PUMPING ENGINES

...wherever Oil is produced!



Whether Operating in Isolated or Crowded Areas—Under All Conditions—CSCO Pumping Engines are Easiest to Maintain

Only CSCO Engines have ALL 4 of these important features:

EASY TO REPAIR . . . CSCO parts needing repair or attention can be removed from the engine with a minimum of disturbance of adjacent parts or assemblies. The reason: CSCO exclusive design embodies unit assemblies permitting quick and easy accessibility. For example, the piston and rod assembly is easily removed through the crankcase without draining the water or oil. No other essential parts are disturbed!

EASY TO SERVICE . . . There's no need to stop a CSCO to check oil level . . . to add oil . . . to check water level . . . or to add water. And you can SEE when an oil change is needed, for on a CSCO the oil level is plainly visible at all times. Instant wrenchless access to the crankcase, through the extra large opening, makes oil changing and cleaning out of the oil sump easy and quick. Since there's no need to stop, there's no need to restart!

EASY AND SAFE TO START . . . CSCO Engines were designed for oil well pumping — and of top engineering importance was easy and safe starting.

SMOOTH, STEADY OPERATION . . . Flywheel inertia provides peak power while oil damped governor holds throttle steady — permitting engine to average demand, up to full capacity.

CSCO Pumping Engines are available through Supply Stores other than Continental

CONTINENTAL

Serving the Oil and Gas Industries

CONTINENTAL SUPPLY COMPANY

A Division of The Youngstown Sheet and Tube Company

General Offices: DALLAS, TEXAS

Representatives in All Principal Oil Fields of the World

The Petroleum Industry . . . Since 1859 Helping Make America Great

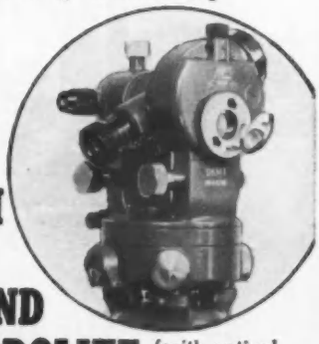
*IN TEXAS

...AND THE WORLD OVER

KERN SURVEYING INSTRUMENTS

*The Bridge Division of the State of Texas Highway Dept. uses Kern Instruments

WORLD FAMOUS FOR
Working Speed
Operational Simplicity
Accuracy & Economy



DKMI TEN SECOND THEODOLITE (with optical micrometer)

- Exceptional portability and precision.
- Readings automatically ... AT A GLANCE.
- Direct reading to 10". Estimation to 1". Average working accuracy —3-4 secs.
- Can be used with electric lighting unit for night work.

KERN CENTERING TRIPOD

Unique—a Kern first! Centers instruments in seconds with remarkable accuracy. Assures exceptional stability with ball-and-socket head, supporting instrument coupling.

★

Write for Brochure DK 518 - 8

PROMPT, RELIABLE SERVICE
FACTORY TRAINED PERSONNEL

Kern SWISS

The FINEST in SURVEYING EQUIPMENT

KERN INSTRUMENTS INC.
120 Grand St., White Plains, N. Y.

aspirated and spark ignited versions. They are of four-cycle design.

Principal differences between the new 8- and 12-cylinder engines and former models are in cylinder heads, exhaust manifolds, method of supercharging, and, in the case of the spark-ignited engines, the fuel used and method of igniting it. Advantages of former models such as the completely water-jacketed, port-free cylinder liners and the low injection pressure, precombustion chamber type fuel injection system have been retained.

Shown is a side view of the new 400 Cat spark ignited engine which features a 10 to 1 compression ratio, a low-tension magneto ignition system and new deep-domed pistons. It is designed to operate on natural gas.

(This item supplements Caterillar Tractor Company data on Pages 1220-1223 of the Composite Catalog, 21st Edition.)

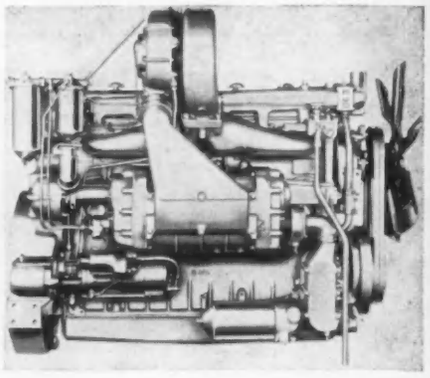
For more data, circle **No. E5** on Reader's Service Card, last page this issue.

Turbopower Engines

The Detroit Diesel Engine Division of General Motors has announced three turbopower engines as additions to its Series 71 line of industrial two-cycle diesels. Presently available are four- and six-cylinder fan-to-flywheel engines and a six-cylinder base-mounted power take-off unit.

Retained in the new models are all features of the Series 71 engine, plus the addition of a single-shaft, exhaust-driven turbine and air impeller.

The four-cylinder engine has a rating of 171 basic horsepower at 2300 rpm.



The six is rated at 236 basic horsepower at 2100 rpm. Because of the compact size in relation to horsepower and better fuel economy, these basic engines also are suited for use as replacement power in on- and off-the-highway trucks. Both fan-to-flywheel engines weigh approximately 9½ pounds per horsepower.

Shown is Detroit Diesel's six-cylinder turbopower engine. Exhaust-driven turbine and air impeller work with engine-driven blower to increase horsepower and all-around efficiency with no increase in fuel input.

(This item supplements General Motors Corporation, Detroit Diesel Engine Division, data on Pages 1417-1423 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E6** on Reader's Service Card, last page this issue.

SAVE Time, Trouble Labor, Money
END CORROSION

with proved products of the American Sand-Banum Co., Inc.

SAND-BANUM
Pure Colloidal Concentrate for ALL types of Boilers

SAND-BANUM SPECIAL
In Handy Tablets For ALL Radiator Cooling Systems – Stationary or Mobile

Also

SABCO
Rust Preventive Aluminum paint; 2 coats in one application.

RUSTEND
Clear Rust Arrestor—Rust Preventor

SABANOL
For clean and complete fuel oil burnability

Stocked by Leading Supply Houses
GULF COAST DISTRICT REPRESENTATIVES
Western Sand-Banum Company, 1717 Chenevert St., Houston, Texas
Colloid Products Co., 2825 Storey Lane, Dallas, Texas

AMERICAN SAND-BANUM CO.
ESTABLISHED 1926
MEADOW BROOK NATIONAL BANK BUILDING
FREEPORT, NEW YORK

Immediate Delivery on "EQUITY" Standard...

45' TUG
(Single Screw)

AND . . .

55' TUG
(Twin Screw)

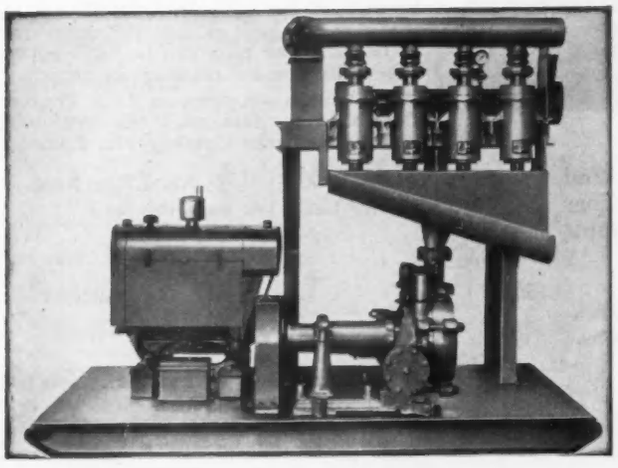
Wire – Phone – Write for Details TODAY

Offshore Supply Vessels
Crew Boats – Tenders

EQUITABLE EQUIPMENT CO., INC.

Dept. X

410 CAMP ST. NEW ORLEANS 12, LA.



The DORRCO MUD D-SANDER

A new device for removing sand and abrasive solids from drilling mud.

- Up to 20% faster drilling
- Increases bit footage
- Greatly reduces pump maintenance
- Casing runs easier

For full information, write

SWACO SALT WATER CONTROL, INC.
A Sid Richardson Development Company
1211 Ft. Worth National Bank, Ft. Worth, Texas

Effectively Correcting

NOISE and PULSATION

is a specialty

—our specialty

Noise and Pulsation are more than irritating—they are costly in reduced equipment efficiency, increased maintenance and operating hazards.

The Burgess-Manning Snubbing Principle, which has been engineered to varied problems of noise and pulsation in every branch of industry thru many years, will effectively prevent:

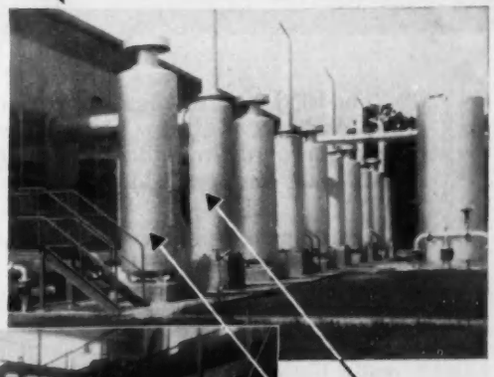
(1) Intake and exhaust noises of air, steam and gases from compressors, blowers, jets, turbines, engines, etc.

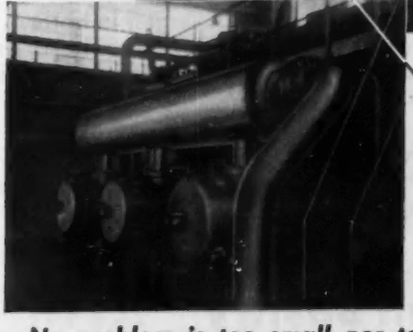
and

(2) Gas pulsation and piping vibration caused by surge in compressor, blower and pressure reduction system.

They correct your trouble at the source.

Burgess-Manning Snubbers may be had to provide such extra services as: heat recovery, air cleaning, water separating or spark arresting.





EXHAUST

INTAKE

No problem is too small nor too large . . .

Send us a description of your problems for recommendations.

BURGESS-MANNING COMPANY

Sound Engineering 715 East Park Avenue, Libertyville, Illinois
Dallas, Texas

Announcing---

1956 PERMIAN BASIN OIL SHOW

OCTOBER 18-21

Aerial view of show grounds showing completely enclosed exhibit buildings and a portion of the exhibit grounds. Note Boom Town Rig in foreground.

The 1956 show will again be presented at Fair Park, 42nd and Andrews Highway, Odessa, Texas. Exhibit buildings have improved. An additional 56,000 square feet of inside floor space has been added.

Contracts for exhibit space are now ready and reservations are being accepted. Contracts to previous exhibitors will be mailed this month.

This year's show will be the largest in history . . . the only really big show in the industry since 1954. Exhibits will feature latest developments in oil industry equipment and techniques.

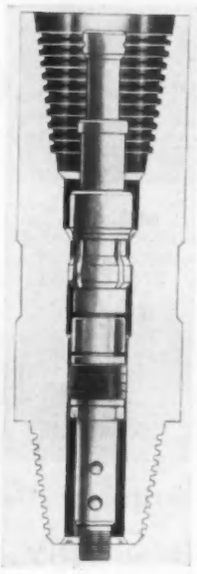
If you are interested in exhibit space we urge you to write immediately for contracts and complete information. Address inquiries to:

Permian Basin OIL SHOW
219 W. Third · Odessa, Tex.

Plan now to SHOW and GO
. . . it's the Oil Field Worker's Show!

DRILLING

Drilling Safety Device



Otis Pressure Control, Inc., has introduced a drill pipe nipple and removable plug which provides a quick, safe means of plugging drill pipe if a well begins to unload during drilling or workover operations. The equipment consists of a nipple built on drill pipe dimensions and a removable plug choke which seals off in the polished bore of the nipple.

The equipment can be used three ways to plug the drill stem in case of a threatened blow-out. If there is a possibility that the well might unload as pipe is being run, the nipple can be installed in the string near the bottom with the plug in place to allow flow downward through the drill stem. The nipple also may be run in as part of the string when pipe is tripped, and, if the well comes in, a gate valve can be stabbed onto the joint at the surface, and the plug pumped down into the nipple.

Or the nipple and the gate valve can be stabbed onto the joint in the rotary, the plug pumped in, and the string run to bottom. The plug can be retrieved on a wire line, under pressure, as desired.

(This item supplements Otis Pressure Control, Inc., data on Pages 3985-4020 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E7** on Reader's Service Card, last page this issue.

Keyseat Tool

McClinton Tool Company's keyseat tool has been designed to cut through keyseats, dog-legs, knots and other formation obstructions that might be encountered ahead of stiff drill collars when coming out of the hole. A single solid bar of heat-treated chrome nickel steel, the 12-foot tool was designed long to provide more cutting area to do the job each stroke with the drill string when working through a tight place of keyseat. It can be run continuously in deviated holes, even if the hole is only one degree off, to guard against keyseats and tight spots in the hole.

(This item supplements McClinton Tool Company data on Pages 3178-3179 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E8** on Reader's Service Card, last page this issue.

WHITNEY
NATIONAL BANK
OF NEW ORLEANS

Established 1883

CONDENSED STATEMENT OF CONDITION
APRIL 10, 1956

RESOURCES

Cash and Due from Banks	$ 97,465,516.06
U. S. Government Obligations	142,511,282.65
State, Municipal and Other Public Bonds	21,493,982.73
Other Bonds and Securities	689,416.35
Loans and Discounts	165,657,514.72
Bank Premises	3,718,913.59
Other Real Estate	128,122.71
Customers' Liability Account of Acceptances	780,426.62
Accrued Income and Other Assets	1,581,759.89
TOTAL	$434,026,935.32

LIABILITIES

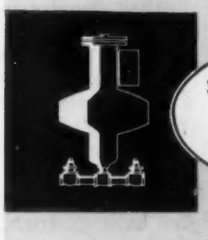
Deposits		$389,830,549.48
Bills Payable		12,000,000.00
Acceptances		870,201.47
Dividend Payable July 2, 1956		112,000.00
Reserve for Taxes, Accrued Interest and Expenses		1,895,806.69
Other Liabilities		90,680.21
Capital Stock	2,800,000.00	
Surplus	17,200,000.00	
Undivided Profits	9,227,697.47	
		29,227,697.47
TOTAL		$434,026,935.32

DEPOSITARY OF THE UNITED STATES GOVERNMENT, STATE OF LOUISIANA AND CITY OF NEW ORLEANS

MEMBER OF THE FEDERAL DEPOSIT INSURANCE CORPORATION

If you're considering oil metering (and you should)

GET THE BEST...



***ROLOCHECK®**

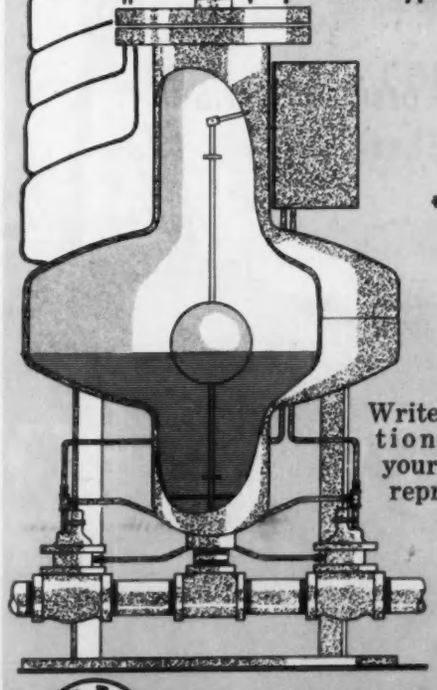
Meters

Three important things to look for in choosing dump-type meters are:

ACCURACY — none can match the inherent accuracy of the ROLOCHECK—it's *shaped* for accuracy, with fast-response controls.

DEPENDABILITY — ROLOCHECK offers a new concept in maintenance-free operations — no close-clearance moving parts for sediment to bother.

EXPERIENCE — Rolo introduced the new concept in oil metering, and leads the way with **many times more of this type meter in operation than those of all other similar types combined.**



* PATENTS ISSUED AND PENDING

Write for information, or contact your nearest Rolo representative.

ROLO

CRUDE OIL METERING SPECIALISTS

MANUFACTURING COMPANY

P. O. Box 6763, Houston 5, Texas

BRANCHES: TEXAS—Corpus Christi; Midland; Kilgore; Stamford • Tulsa • Lafayette; New Orleans • Los Angeles; Bakersfield • Casper • Mt. Vernon, Ill. • Caracas, Venezuela (PETICON).
EXPORT OFFICE: R. S. Stokvis & Sons, Inc., 17 Battery Place, New York, N. Y.

6434

Tool Joint Compound

Jet-Lube 21, a multi-purpose tool joint compound containing metallic lead, molydisulphide and graphite, manufactured by Jet-Lube, Inc., now is fortified with flake copper. The new compound prolongs tool joint life, will not wash out and speeds up round trips. It will not settle out or harden.

(This item supplements Jet-Lube, Inc., data on Pages 2695-2698 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E9** on Reader's Service Card, last page this issue.

Portable Rotary Drills

Joy Manufacturing Company has announced two portable rotary drills for use in slim hole production and exploration drilling. Similar in design, the two drills, designated Models 510 and 340, make up the Joy 5000 Series of truck or trailer mounted drilling rigs.

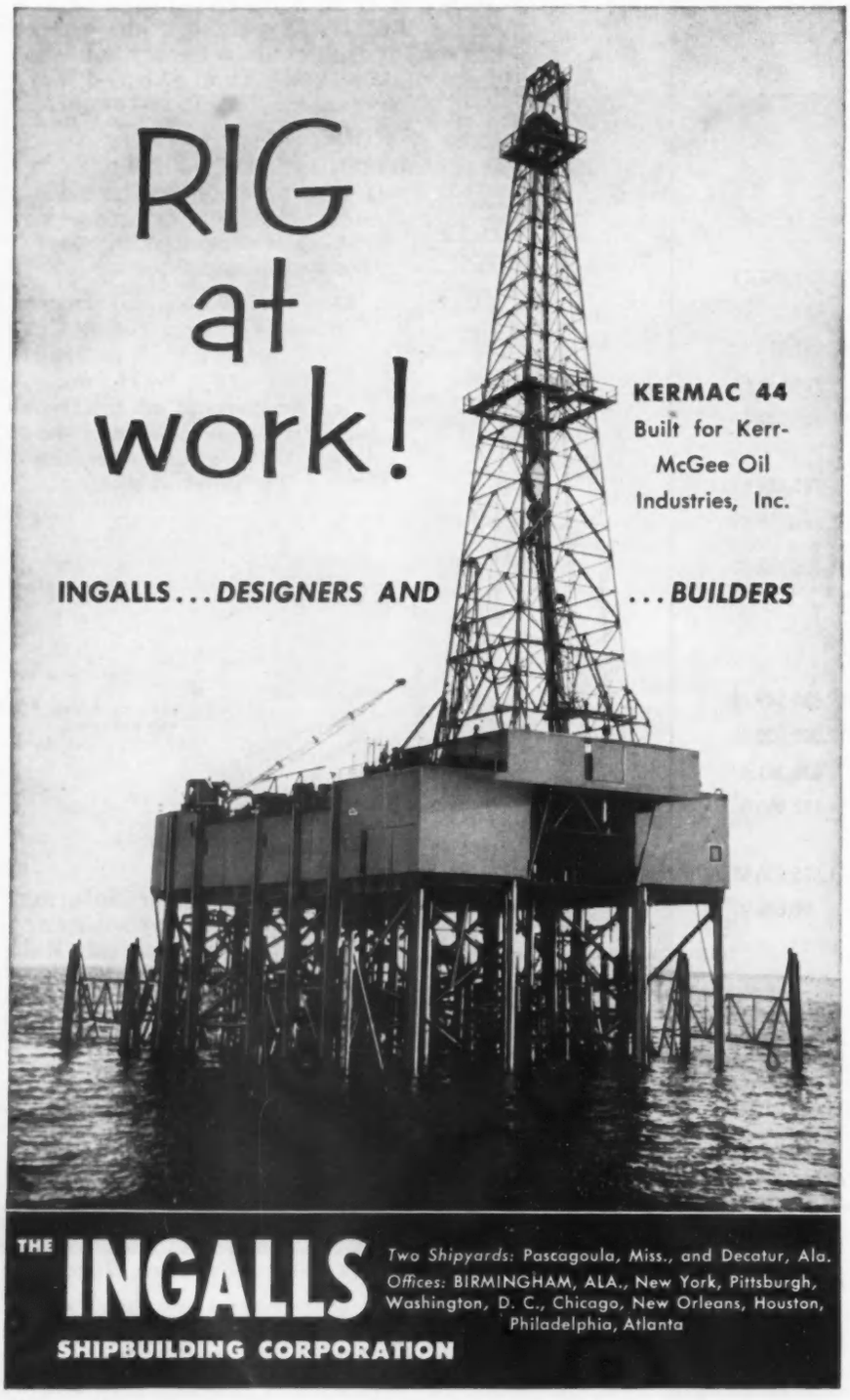
The Model 510 is designed for drilling to a depth of 5100 feet with 3½-inch drill pipe. Features include an oil bath rotary table with 18-inch opening and API taper, air operated clutches, hydromatic brake for hoisting drum, and 85-foot mast with 80 feet of clearance between top of rotary table and bottom of crown block, capable of pulling Range 2 doubles.

The Model 340 is designed for drilling to a depth of 3400 feet with 3½-inch drill pipe. It features an oil bath rotary table with 12-inch opening and API taper, air operated clutches, optional hydromatic brake for hoisting drum, a 65-foot mast with 57 feet of clearance between top of rotary table and bottom of crown block, capable of pulling Range 1 doubles with the standard mast.

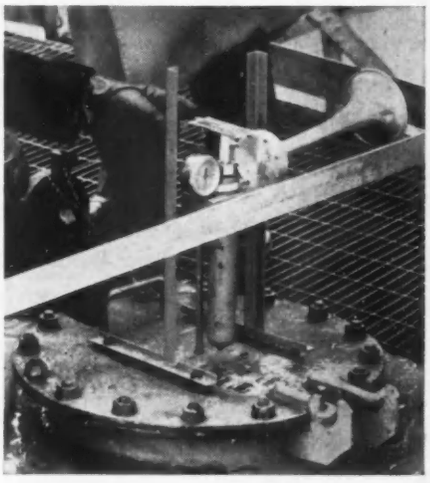
Mounted on a single trailer, both models are within highway limits and can be moved on to location and rigged up within a few hours.

(This item supplements Joy Manufacturing Company data on Pages 2741-2760 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E10** on Reader's Service Card, last page this issue.


RIG at work!
KERMAC 44
Built for Kerr-McGee Oil Industries, Inc.
INGALLS... DESIGNERS AND ...BUILDERS
THE INGALLS SHIPBUILDING CORPORATION
Two Shipyards: Pascagoula, Miss., and Decatur, Ala.
Offices: BIRMINGHAM, ALA., New York, Pittsburgh, Washington, D. C., Chicago, New Orleans, Houston, Philadelphia, Atlanta

PRODUCTION



Signal Horn

A self-powered automatic signal horn, designed by Falcon Alarm Company, Inc., alerts plant crews against overflow of petroleum, chemical and petrochemical storage tanks during filling operations. Known as the Falcon Tank-Overflow Horn, the new float-activated unit can be heard more than 1000 feet.

Designed for installation on top of bulk storage tanks, it is powered by harmless carbon dioxide, Freon 12, nitrogen or compressed air and will sound a sharp two to four-minute or longer warning.

The horn consists of two-inch diameter steel cylinder of compressed gas about 12 inches long, pressure gage, horn assembly and float-operated valve assembly. When liquid level in the tank nears safe filling limit, the float activates mechanical linkage to the horn unit and starts the penetrating shrill warning. The signal is rated at from 116 to 122 decibels.

For more data, circle **No. E11** on Reader's Service Card, last page this issue.

R. G. Wise
Baton Rouge

E. B. Bailey
Edmonton

James Williams
Shreveport

R. B. Hunnicutt
Farmington

John McNatt
Glendive

Kenneth Holder
Bakersfield

Frank High
Liberal

E. P. McMillon
Wichita Falls

Hugh Nance
Abilene

Clark Armold
Casper

Lamar Keith
Houston

T. A. McMillon
Odessa

L. W. Streeter
Okla. City

Bo Ferguson
Lubbock

E. L. Ross
Sterling

Mack Martin
Fairfield

16 MANAGERS

with one objective:

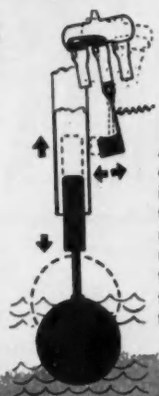
"TO MAINTAIN GEOLOGRAPH'S 13-YEAR RECORD OF UNEXCELLED MECHANICAL WELL LOGGING SERVICE!"

IF you know any—or all—of these men, you know that they are fully capable of managing their respective Geolograph Service Companies. All have had many years of Geolograph Mechanical Well Logging experience.

Geolograph is proud of these managers, and the many men under their supervision. These managers are responsible for the good service you naturally expect—and get—when you specify Geolograph Mechanical Well Logging Service.

GEOLOGRAPH
MECHANICAL WELL LOGGING SERVICE
33 N.E. 27 • OKLAHOMA CITY 1, OKLAHOMA

As SIMPLE and Dependable as the Pull of a MAGNET!



A sleeve, raised and lowered within a non-magnetic tube, attracts or releases an Alnico magnet attached to a mercury switch. Basically, this is Magnetrol.

MAGNETROL

The Simplest, Most Versatile LIQUID LEVEL CONTROL Ever Devised!

Linked to liquid level by infallible magnetic force, Magnetrol is free from the limitations inherent in mechanical or electrical controls. With the actuating magnet rated at 98% of initial strength after 30 years, Magnetrol has *infinite operating life,* with practically no maintenance at all. There are no wearing parts to get out of order.

What's more, Magnetrol's simple operating principle permits easy, economical modification of standard units to meet *any* pressure, temperature or corrosion requirements. That's why there's practically no limit to Magnetrol's use. It's also why "specials" are likely to be standard with us. Magnetrol units control level changes from .0025-in. to 150-ft. —with single or multi-stage switching.

MAGNETROL, Inc.

● SEND COUPON FOR DETAILS

MAGNETROL, Inc. 2114 S. Marshall Blvd., Chicago 23, Illinois
Please send me catalog data and full information on Magnetrol Liquid Level Controls.
Name_____
Company_____
Address_____
City_____ Zone_____ State_____

PERFORATE TUBING IN THE WELL

KINLEY TUBING PERFORATOR

M. M. Kinley Company

Licensees

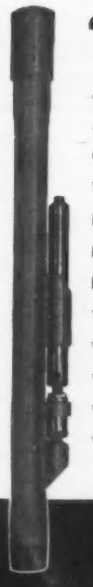
ABILENE, TEXAS
Hudson-Eads, Inc. 2-5331
BEAUMONT
ASEECO ..... 5-7046, ZF 8-2023
CASPER
C. A. White 3-5264
CORPUS CHRISTI
Tubokut Wireline Services 5-1811
HOBBS
Cecil Horne 3-5396
MIDLAND
Lucoous Service & Eqpt. 2-1631
NEW ORLEANS
ASEECO AU-7696
OKLAHOMA CITY
Rainbo Service Co. ..... ME 4-2131, ME 2-2024
LIBERAL, KANSAS
Rainbo Service Co. ..... Main 4-3598
PETTUS, TEXAS
Eddie Jones Engineering Co. ..16 or Beeville 1547
WICHITA FALLS
Hudson-Eads, Inc. 2-3767, 2-8584, 3-4690
WHITTIER, CALIF.
Kline Wire Line Co. ..... OXford 3-2731

TRADE MARK REG. U. S. PAT. OFF.

TIME TESTED

MACCO

GAS LIFT



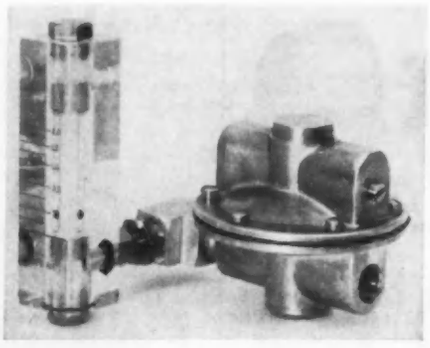
Telephones:

ALICE
MO 4-4993 MO 4-5787
MIDLAND
Mutual 3-3936
ODESSA
Federal 7-1943
VICTORIA
Hillcrest 5-1731 WJ-53395
BEAUMONT
5-1958 ZF-78424
HOUMA, LA.
2-1285 7728
NEW IBERIA, LA.
Emerson 4-2674
*LONG BEACH, CALIF.
NE 6-4666
*LOS ANGELES, CALIF.
LU 7-5261
*VENTURA, CALIF.
MI 3-4033
*TAFT, CALIF.
5-3148
*Calif. Rep. Emsco Mfg. Co.

MACCO
OIL TOOL CO.
1521 PRINCE ST., HOUSTON 8, TEX.

UN 1-1253

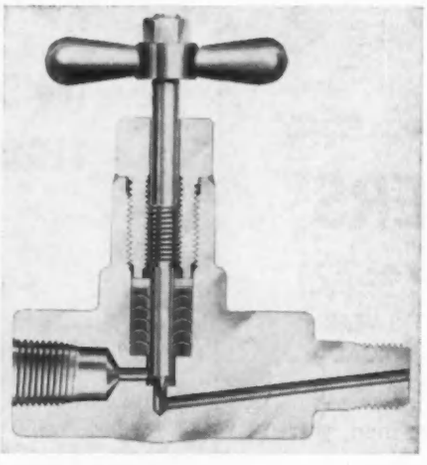
HO 5-7585 MI 9-0747 MO 5-3841
MO 5-6809 UN 4-6441 HI 7-2396



Differential Regulator

A differential pressure regulator incorporating a self-contained needle valve is a recent development of the Conoflow Corporation. The differential relay can be used for economical purging with air, water or gas in services where actual measurement of flow is unnecessary. It also can be supplied in combination with a small flow rate indicator as a complete, compact, inexpensive purge meter package. Ranges from 0.2 to 2.0 scfh of air and 20 to 200 cc/min. of water are available.

For more data, circle **No. E12** on Reader's Service Card, last page this issue.



Needle Valve

The Oil Center Tool Company has announced a 30,000 pound test pressure gage needle valve designed to handle the highest pressures encountered in process work. This new valve features a one-piece alloy steel body, a welded bonnet for maximum safety and a multi-compound, non-crushable V-type packing especially developed to withstand extremely high pressures and temperatures.

(This item supplements Oil Center Tool Company data on Pages 3741-3776 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E13** on Reader's Service Card, last page this issue.

Hydraulic Pumping Unit

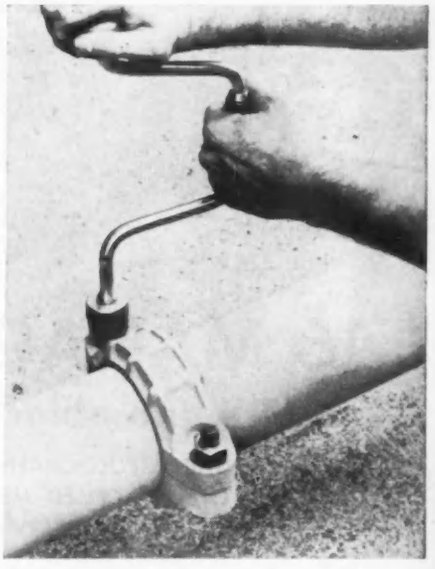
A double-cylinder, 10-foot stroke unit, designed especially for slow pumping of heavy oil, with polished rod loads of up to 24,000 pounds, has been added by S. C. Carter Company, Inc., to their line of hydraulic pumping units.

Upstroke velocity of this new model is set by the delivery of the power pump; downstroke is made according to the rate of fall of the sucker rods through the heavy crude. The long slow upstroke permits bottom-hole pump operation at high volumetric efficiency.

The new model consists of a twin-cylinder assembly and compact power unit which includes a positive displacement power pump and storage tank. The cylinder assembly mounts on a pedestal which is unitized with the power unit so that the equipment can be moved away from the wellhead as a unit with the cylinder assembly in place for well servicing when required.

(This item supplements S. C. Carter Company, Inc., data on Pages 1085-1087 of the Composite Catalog, 21st Edition.)

For more data, circle **No. E14** on Reader's Service Card, last page this issue.



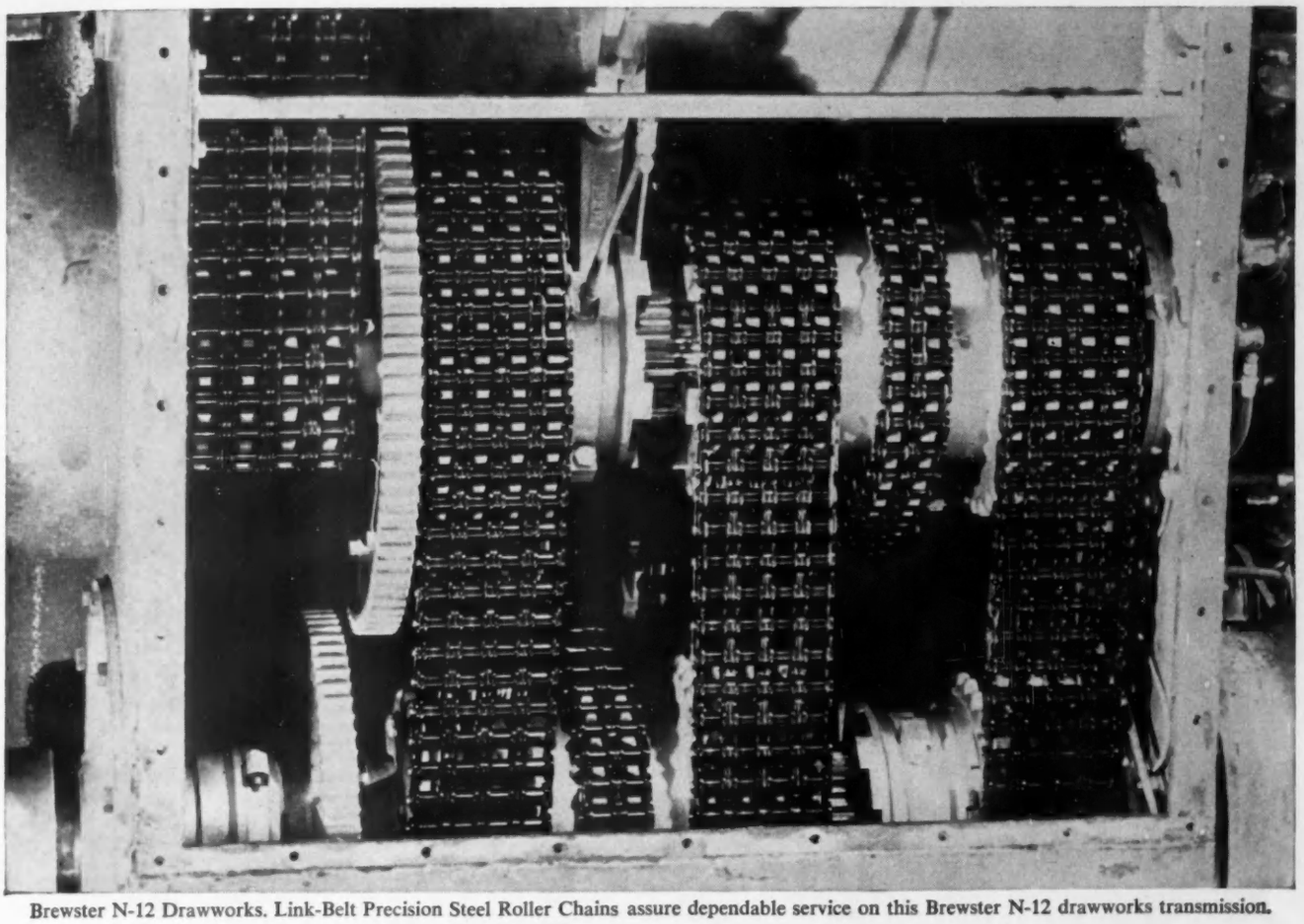
Grooved Pipe Couplings

With Gustin-Bacon Manufacturing Company's new Gruvajoint couplings for grooved pipe, it is possible to save up to 50 percent in piping costs on tank batteries, tanks, manifolds and related installations. The savings is possible because of the couplings' low cost, light weight and ease of installation. Flanging, threading and welding is unnecessary, and chain tongs or pipe wrenches are not needed. The couplings are available in seven sizes: 2-inch through 8-inch.

(This item supplements Gustin-Bacon Manufacturing Company data on Page 2109 of the Composite Catalog, 21st Edition.)

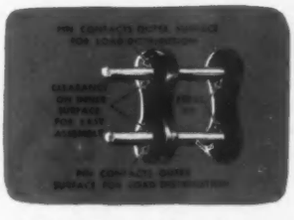
For more data, circle **No. E15** on Reader's Service Card, last page this issue.

Circle numbers on Readers' Service Cards on last page



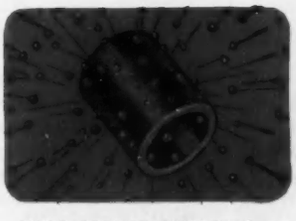
Brewster N-12 Drawworks. Link-Belt Precision Steel Roller Chains assure dependable service on this Brewster N-12 drawworks transmission.

Why today's high speeds and heavy drilling strings require LINK-BELT roller chain EXTRAS



FASTER COUPLING and uncoupling of multiple-width chain with E-Z Assembly.

SHEPHERD'S CROOK COTTERS will remain in place under severe operating conditions.



SHOT-PEENED ROLLERS have greater fatigue life, added ability to withstand impact.

PRE-STRESSING of multiple width chain provides uniform load distribution.

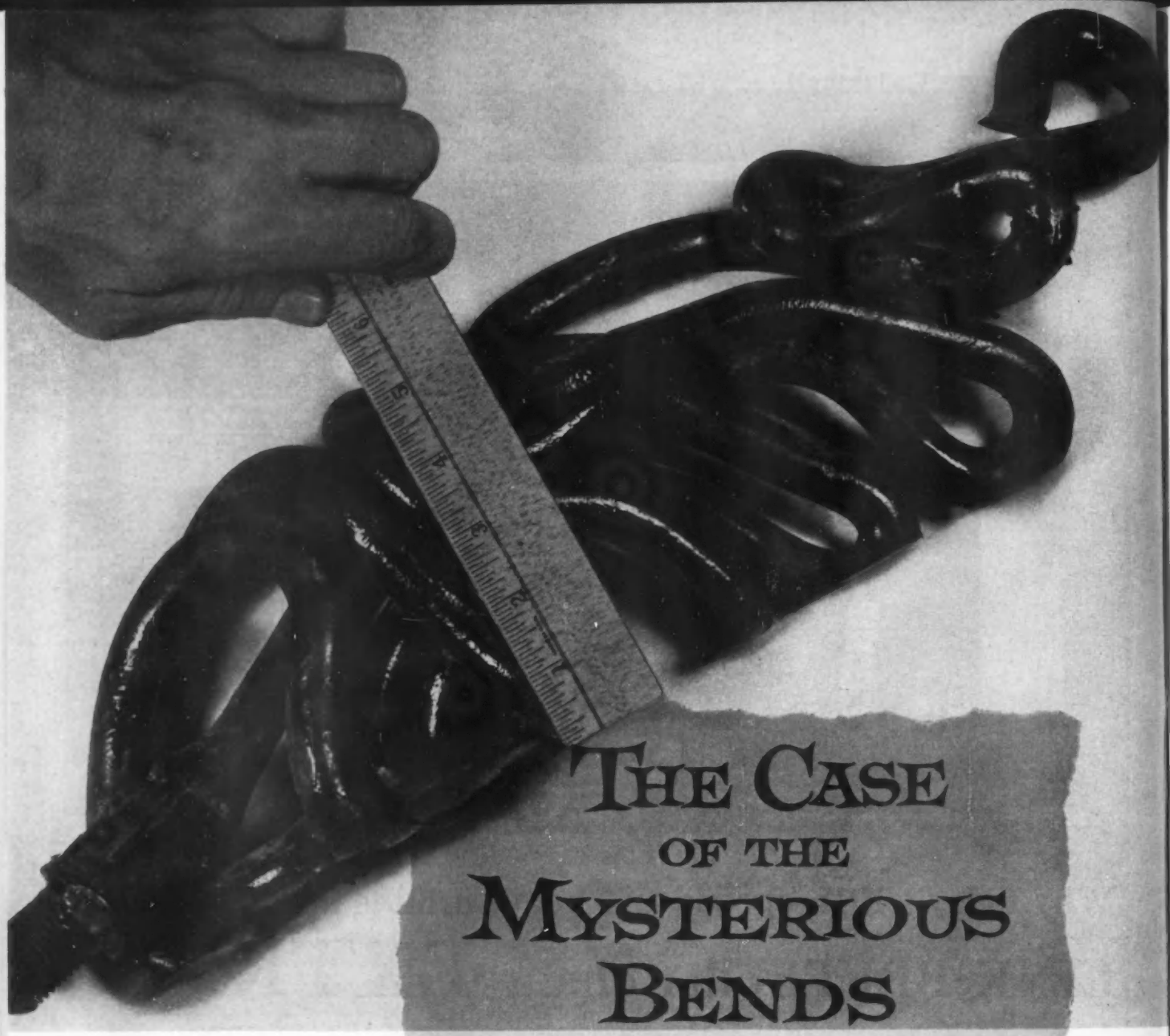
MODERN high-powered oil field equipment demands more stamina than ever before from drives. And the advanced design and manufacturing extras of Link-Belt Precision Steel Roller Chain show up in longer-lived, more efficient performance. That's been proved in oil industry service throughout the world on the toughest of drive applications.

For greater life, less downtime on any job, specify Link-Belt next time you order roller chain. It's a complete line—single and multiple widths, and sprockets through 3-in. pitch. You can also get a copy of new oil field catalog 2680 at your Link-Belt office or any leading supply store in the field.

LINK-BELT

ROLLER CHAINS AND SPROCKETS

LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 21, Odessa, Tex., Shreveport, La., Los Angeles 33, Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields. 14,020



THE CASE OF THE MYSTERIOUS BENDS

IT HAPPENED NEAR CAPROCK, New Mexico. The well quit pumping. Neither the 9000 ft. string of sucker rods nor the tubing could be pulled. What had gone wrong?

The long task of "fishing" and a "work-over" got under way. The foreign-made casing had collapsed in two places. Two joints of tubing had split . . . and from one of these split sections they removed the exhibit shown above.

Fourteen feet of ¾" sucker rods had been compressed into *eighteen inches.*

Have you ever seen a sucker rod so twisted? Like ribbon candy! *Yet the rod didn't break!* (Rod partings shown in the picture were caused by a diamond core bit that milled over the rod during its removal.)

Frankly, it's hard to believe that a sucker rod could be ductile and tough enough to take such terrific bends without fracturing. This phenomena is as surprising as it is mysterious.

The rod is one of ours . . . an "Oilwell" Grade "W"* . . . and it's fully heat-treated to combine high strength with high ductility . . . the kind of rod you can really depend on.

***GRADE "W" is one of our strongest rods . . . recommended for heavy duty in non-corrosive wells and for sulphide service.**

Complete Heat-Treatment of sucker rods, including LIQUID QUENCHING AND TEMPERING, is a process that is exclusive with "Oilwell." It includes extra production steps that bring out all the advantages of the alloys in the steel. Three of the five "Oilwell" sucker rod grades receive this complete treatment . . . to give you stronger, safer, longer lasting rods. Yet, they cost no more than competitive grades.

Write or ask for a free copy of our Sucker Rod Comparison Chart.

OIL WELL SUPPLY
DIVISION UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

Area Offices— CALGARY, ALBERTA
CASPER, WYOMING....COLUMBUS, O.
DALLAS, TEXAS....HOUSTON, TEXAS
TULSA, OKLA...LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL" TRADE MARK

UNITED STATES STEEL

Transportation. The Universal 'Jeep'* and the 4-Wheel-Drive 'Jeep' Station Wagon, with the extra traction of their 4-wheel drive, take supervisors, work crews or tool-pushers and their equipment and supplies almost everywhere on the lease, road or no road, up 60% grades, through water 2 feet deep... wherever they have to go, in good weather or bad.

How 'Jeep' all-wheel traction speeds oil and gas operations!

Pipeline Construction. The 'Jeep' Truck is the only time-tested and performance-proved 4-wheel drive truck in its weight class. It carries a payload 63% of its curb weight or tows heavily loaded trailers to pipeline construction areas ordinary vehicles can't reach.

Exploration. With the extra traction of its 4-wheel drive, the Universal 'Jeep' travels remote terrain for prospecting and exploration. In good weather or bad, it takes geologists, crews, equipment and tools almost anywhere in rugged country.

The oil and gas industry pioneers far ahead of roads. It needs the extra traction of rugged 4-wheel drive 'Jeep' vehicles to get through where ordinary vehicles can't, to stay on the job and keep work moving smoothly and on schedule, in good weather or bad.

'Jeep' vehicles are the only 4-wheel drive vehicles in their weight class designed and engineered completely for 4-wheel drive off-the-road use.

For exploration and prospecting... on the lease... along the pipeline... versatile 'Jeep' vehicles carry men, tools and equipment through mud, sand, soft earth, over the roughest terrain. With power take-off, they provide on-the-spot power to operate many types of equipment, from mobile drills to winches. They haul heavily loaded trailers on the road or off. And they shift easily into conventional 2-wheel drive for highway travel at top legal speed.

Billions of miles of use prove that 'Jeep' vehicles spread the cost over many jobs... provide additional savings through long life, low maintenance costs and high resale value. Ask your Willys dealer for an on-the-job demonstration today.

The 'Jeep'

family of 4-Wheel-Drive vehicles

WILLYS... makers of the world's most useful vehicles

*Model CJ-5 shown

WILLYS MOTORS, INC., TOLEDO 1, OHIO

This Ocean-Going

. . . is fitted with the best for drilling in remote

and it's all

THE FARTHER YOU OPERATE from established service centers, the more you need the extra margin of safety that is built into every piece of "Oilwell" drilling equipment.

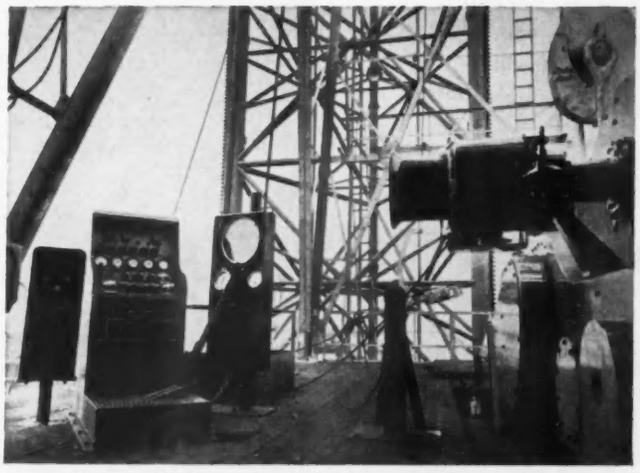
The compact heavy-duty design of each unit conserves floor space while specially engineered hook-ups, such as these, improve safety and control facilities and increase the economy and efficiency of your drilling operations.

"Oilwell" Engineers have designed the drilling machinery applications on more than 30 over-water installations with all the units engineered to work together. Let them figure with you on your next off-shore rig.

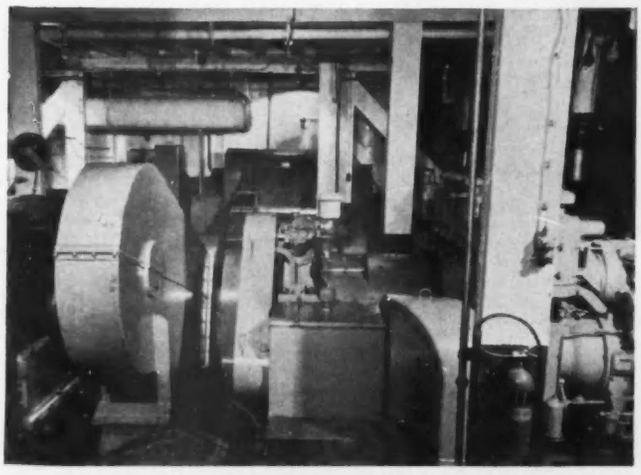
UNITED STATES STEEL

Mobile Drilling Platform

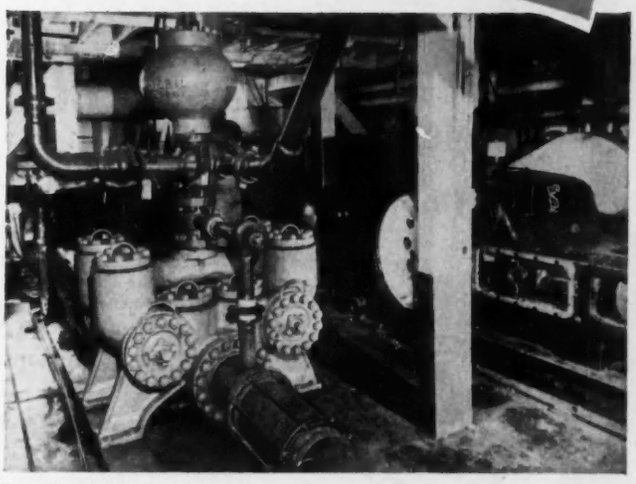
equipment you can buy off-shore locations "Oilwell"!



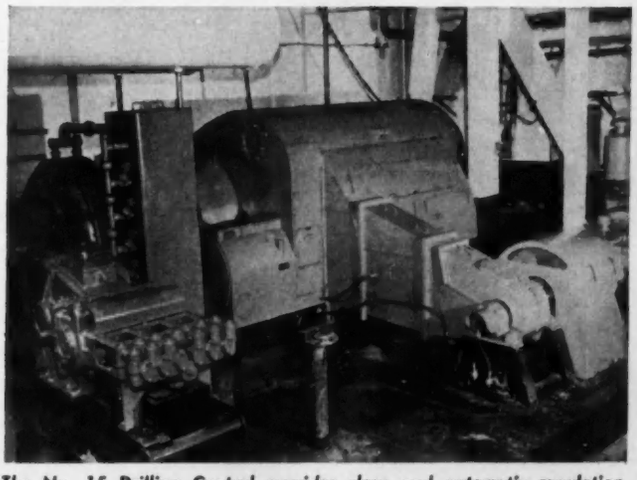
From this derrick-floor console, the driller controls the engines, pumps, automatic feed control, and hoisting facilities (all located below deck) as well as catworks controls for the rotary table and catheads. An operator at the catworks is needed only for sand line spooling.



The No. 96 Draw Works is powered by a No. 1500 Four-Engine Drive and is located in the hull, protected from salt spray. Weight and space are saved by using deck-pad mountings instead of skidwork. Clutches are gap-mounted to facilitate replacement.



Two No. 818-P Slush Pumps provide ample volume-pressure capacity for deepest drilling. Their narrow width and low weight per horsepower, make them perfect for compact over-water work.



The No. 15 Drilling Control provides close and automatic regulation of weight on the bit. This not only increases penetration rates but also affords unique advantages in directional drilling common to off-shore operations.

OIL WELL SUPPLY
DIVISION
UNITED STATES STEEL CORPORATION

Executive Offices—DALLAS, TEXAS
Export Office—
30 ROCKEFELLER PLAZA
NEW YORK 20, N. Y.

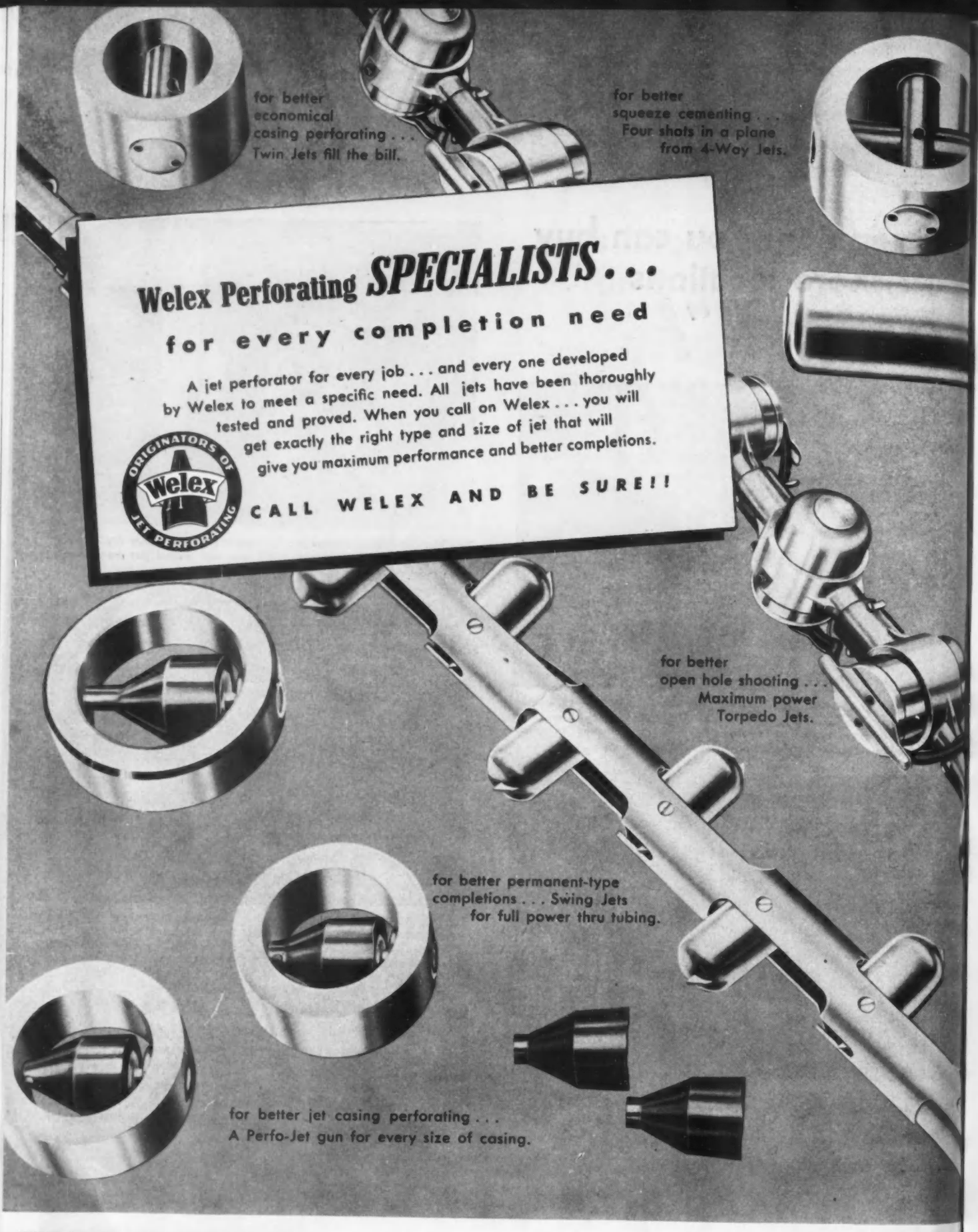
Area Offices—
CALGARY, ALBERTA
CASPER, WYOMING.....COLUMBUS, O.
DALLAS, TEXAS.....HOUSTON, TEXAS
TULSA, OKLA.....LOS ANGELES, CALIF.

Branches Serving All Oil Fields

USS TRADE MARK

"OILWELL" TRADE MARK

UNITED STATES STEEL


for better economical casing perforating . . . Twin Jets fill the bill.
for better squeeze cementing . . . Four shots in a plane from 4-Way Jets.
Welex Perforating SPECIALISTS . . .
for every completion need
A jet perforator for every job . . . and every one developed by Welex to meet a specific need. All jets have been thoroughly tested and proved. When you call on Welex . . . you will get exactly the right type and size of jet that will give you maximum performance and better completions.
ORIGINATORS OF Welex JET PERFORATING
CALL WELEX AND BE SURE!!
for better open hole shooting . . . Maximum power Torpedo Jets.
for better permanent-type completions . . . Swing Jets for full power thru tubing.
for better jet casing perforating . . . A Perfo-Jet gun for every size of casing.

ORIGINATORS OF Welex JET PERFORATING — Welex JET SERVICES, INC.

WELEX JET SERVICES, INC.

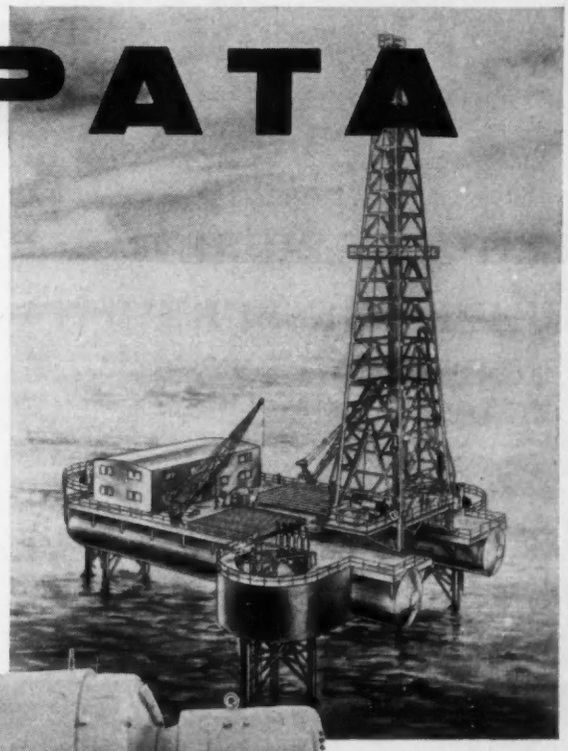
1400 E. Berry Street • Fort Worth, Texas

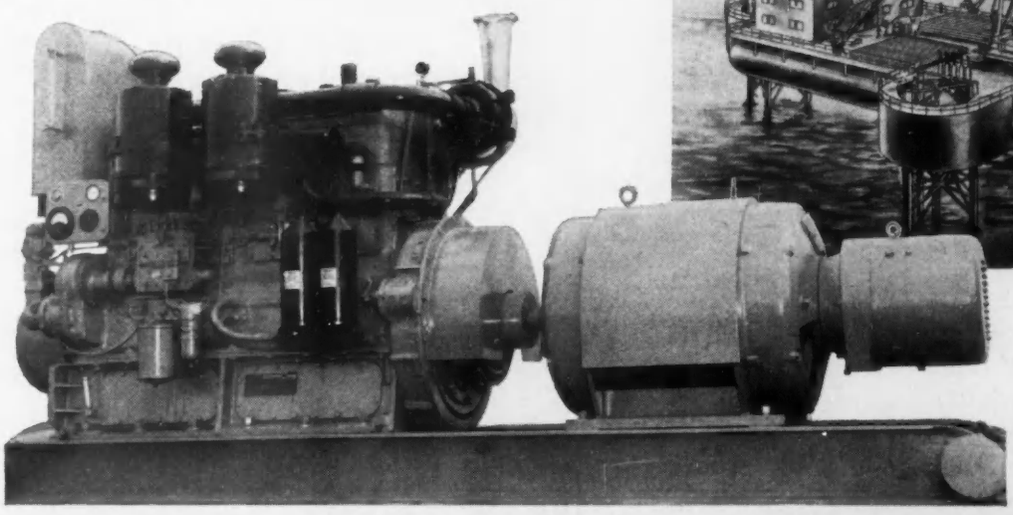
SALES OFFICES: Dallas, Duncan, Wichita

DIVISION OFFICES: Houston, Midland, Tulsa, Oklahoma City, Denver

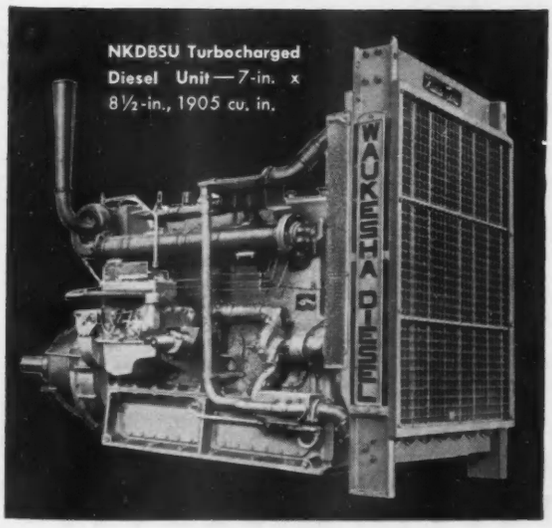
DISTRICT OFFICES: Abilene, Ardmore, Bartlesville, Beaumont, Corpus Christi, Falfurrias, Farmington, Fort Morgan, Great Bend, Hobbs, Houma, Houston, Lafayette, Liberal, Odessa, Pampa, Pauls Valley, Plainville, San Angelo, Shawnee, Sherman, Snyder, Stillwater, Wichita Falls, Winfield.

on the ZAPATA off-shore platform





WAUKESHA *Turbodiesels* supply reliable generator power



This mobile off-shore platform of the Zapata Off-Shore Company of Houston, Texas, has two engine generator sets to supply auxiliary power. A 1200 rpm Model NKDBS Waukesha Turbodiesel powers each of these 200 KW, 3-phase, 120/208 volt generator sets which are built by the Reagan Equipment Co. of New Orleans, La.

The Waukesha NKDBS is a 6-cyl., 1905 cu. in., counterbalanced crankshaft, turbo-supercharged Diesel. A rugged, compact engine, it has lively acceleration, clean burning, prompt starting, and great overall economy. Waukesha's exhaust turbocharger system, unique patented combustion chamber, and design features proved in many years' service provide smooth, **extra** power—up to 368 hp in this NK Series Turbodiesel. Send for Bulletin 1634.

50th ANNIVERSARY Waukesha 1906-1956

314

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN

New York • Tulsa • Los Angeles

PROVIDES MORE DRIVE PRESSURE DATA

HALLIBURTON DRILL STEM TEST!

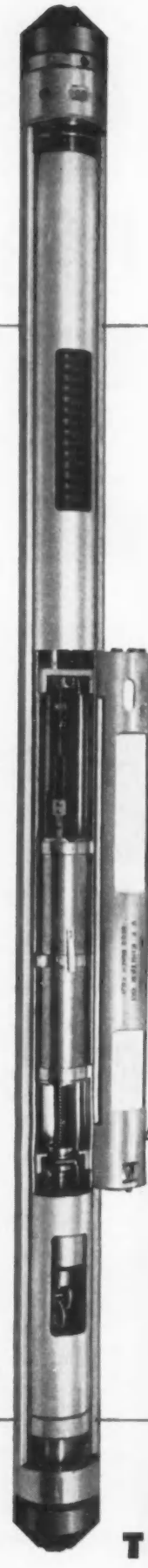
With BT Gauge Accuracy In Dual CIP Readings

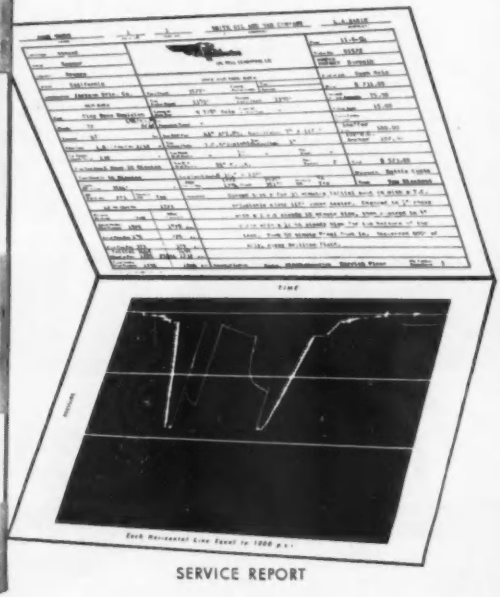
New techniques in drill stem testing give oilmen vastly improved knowledge of their formation drive pressures. Halliburton's new Dual Closed In Pressure method gives far more detailed knowledge of well formation conditions. Accuracy and reliability of that information reaches a new high with the ultra-sensitive Bourdon Tube Gauge. No other pressure gauge now in use for well testing offers all these advantages:

- *Negligible friction or lag*
- *Accurate within less than ½ of 1%*
- *Calibrated every sixty days by certified dead weight tester*
- *Pressure deflection readings made within 1/1000 inch*

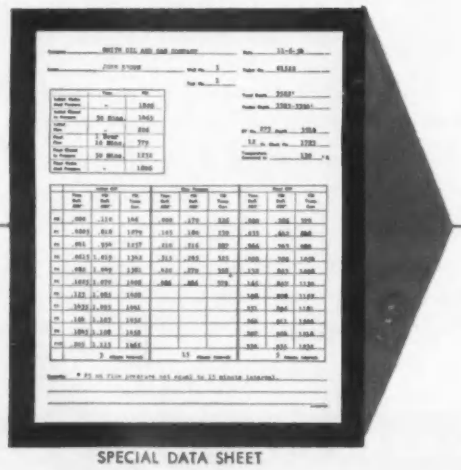
Complete, more accurate information from Halliburton's Dual Closed In Pressure readings—with Bourdon Tube Gauge sensitivity—has enabled thousands of well owners to develop their wells for highly profitable production.

It's one of many reasons why Halliburton's best in drill stem testing. And all the benefits of a Halliburton test are available at far less than the cost of guessing wrong. So phone your local or district office of the Halliburton Oil Well Cementing Company.





SERVICE REPORT



SPECIAL DATA SHEET

COMPLETE DATA SENT ON REQUEST

Add this valuable information to your Halliburton Service File

HALLIBURTON TESTING SERVICE

250 SERVICE CENTERS—JUST MINUTES AWAY FROM ANY RIG

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Hundreds of "Royal Scintillators" have been purchased by leading oil companies and independent geologists for use in investigating the radioactive "halos" surrounding oil fields. The purchasers of these units were so satisfied they demanded an even more sensitive instrument of the same type.

In response to this demand, a special Project team of engineers at Precision Radiation Instruments has developed the new Model 118-C with an enormous crystal measuring 7″ in diameter, and with a sensitivity twelve times that of the original model 118 "Royal Scintillator." This instrument has a counting rate of six million counts per minute in a one MR/HR field of radiation. It's the finest instrument of its type in the world.

Those companies who have benefited from the sensitivity, accuracy and dependability of the Model 118 will certainly want to add the Model 118-C to their present geophysical equipment. Those who have not yet benefited from this advanced technique will want to start with the most sensitive instrument of its kind in the world . . . the "Royal Scintillator" Model 118-C.

The bigger the crystal,

the brighter

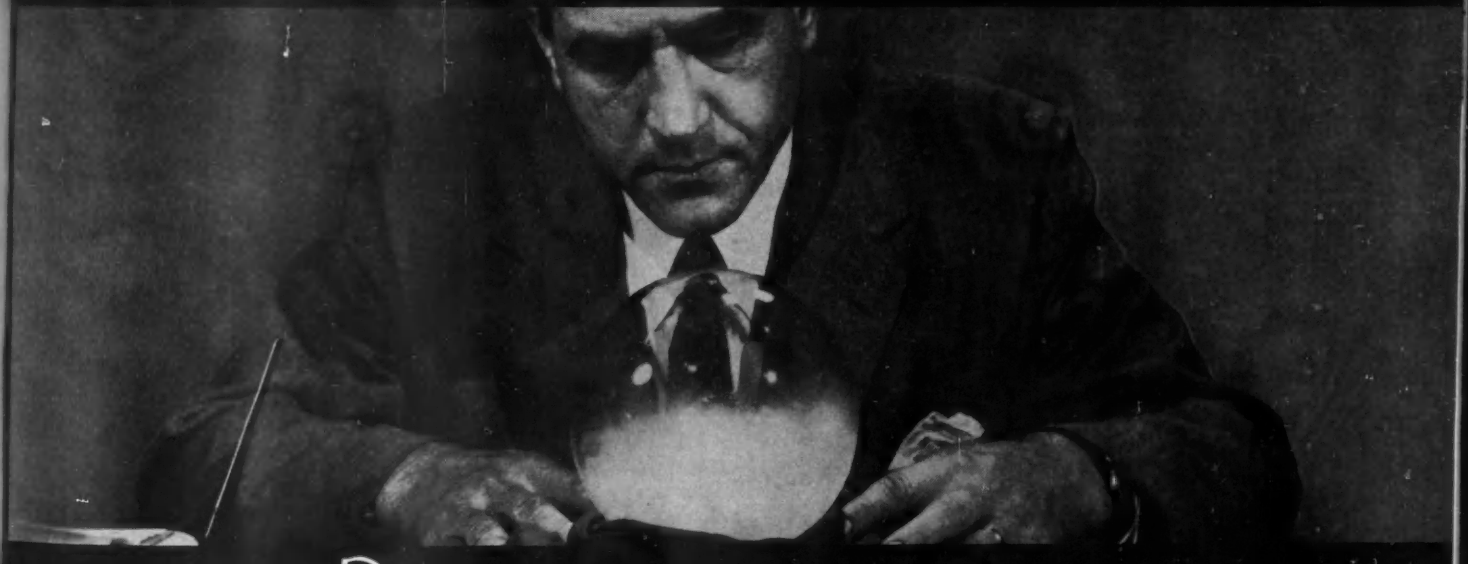
the future

For those who want a fine "Scintillator" at a moderate cost, PRI has also designed a successor to the famous Model 118. The new model 118-B "Royal Scintillator" has a 3¼″ diameter crystal with twice the sensitivity and counting rate of the previous model. PRI's expanded production has made this improved instrument possible at no increase in price.

URANIUM PROSPECTING

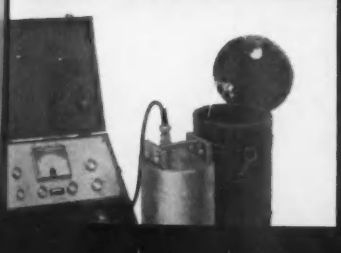
The "Royal" is the finest instrument made for uranium prospecting, as well as investigating the radiation pattern around oil fields. Its use for this purpose should not be overlooked by oil geologists.

For further information contact your dealer . . . or write direct for free pamphlet "The Principles of Oil Field Detection with Scintillation Counters" and complete catalog of Geiger Counters and Scintillators.



PRECISION RADIATION INSTRUMENTS, INC.

WORLD'S LARGEST MANUFACTURERS OF RADIATION INSTRUMENTS



PRECISION RADIATION INSTRUMENTS, INC., 4223 West Jefferson Boulevard, Los Angeles 16, California

Please send Free Oil Survey Pamphlet and Catalog. WO

Name_____ Title_____

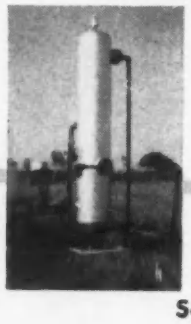
Company_____

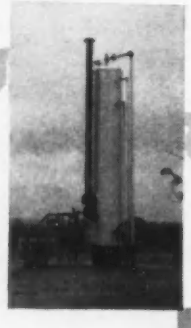
Address_____

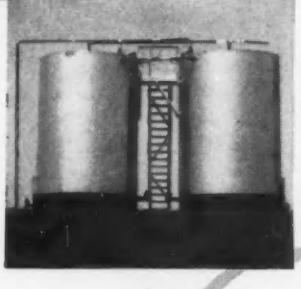
City_____ State_____

TEN GRAVER STORES

to supply your needs for oil field equipment in the mid-continent area







including

Heaters

Treaters

Separators

Dehydrators

Walkways and Stairways

Tanks—Bolted and Welded

WYO. NEBRASKA COLO. KANSAS NEW MEX. OKLAHOMA TEXAS LOUISIANA

★ Casper

Sidney •

★ Brush

★ Great Bend

• Wichita

★ ★ Tulsa

Sand Springs

• Oklahoma City

★ Lindsay

• Fort Worth

★ Odessa

Lafayette ★

Houston ★

Alice ★

GRAVER®

. . . quality fabricators of oil field equipment

MID-CONTINENT DIVISION

GRAVER TANK & MFG. CO., INC.

SAND SPRINGS, OKLA.

TULSA, OKLAHOMA CITY, LINDSAY, OKLA.; ALICE, HOUSTON, FORT WORTH, ODESSA, TEXAS; LAFAYETTE, LA.; GREAT BEND, WICHITA, KAN.; BRUSH, COLO.; SIDNEY, NEB.; CASPER, WYO.

helps to keep the balance

20 YEARS OF CONTINUING IMPROVEMENT

20 YEARS OF INCREASING COSTS

Over the last twenty years drilling costs have increased tremendously. The tight competition has made drilling contractors increasingly cost conscious. Through these twenty years, Goodall has developed many features that add life to the Goodall rotary hose and help to balance the increasing costs, by giving added value. These exclusive Goodall features mean longer hose life — and that means dollars saved to the drilling contractor.

Goodall rotary hose features include—The Barney Coupling—The Goodall Repair Service (converts damaged Goodall rotary hose into vibrator hose)—The Goodall Guarantee—world wide distribution.

GOODALL RUBBER COMPANY

TRENTON, N. J.

GOODALL RUBBER COMPANY OF TEXAS: Houston, Odessa, San Angelo, Texas.
GOODALL RUBBER COMPANY OF CALIFORNIA: San Francisco, Los Angeles, Seattle, Salt Lake City, Portland.
GOODALL RUBBER COMPANY: New York, Philadelphia, Pittsburgh, Chicago, Denver, St. Paul, Detroit.
EXPORT: Goodall Rubber Company, Trenton, N. J.
STOCKING DISTRIBUTORS: Texas and Louisiana—Houston Oil Field Material Co., Wilson Supply Co., Hunt Tool Company, Harries Sales & Rental Co.; Oklahoma—Iverson Supply Co.; Kansas—Mountain Iron & Supply Co.

MISSION MANUFACTURING CO.

SUPER CHROME PISTON RODS

Two wearing surfaces –

instead of one – give

Mission Super-Chrome

Piston Rods **a double life!**

The first wearing surface is the corrosion-resistant, wear-resistant, **hard Chrome plate.** This wearing surface lasts at least as long as a File Hard rod (much longer under corrosive conditions)

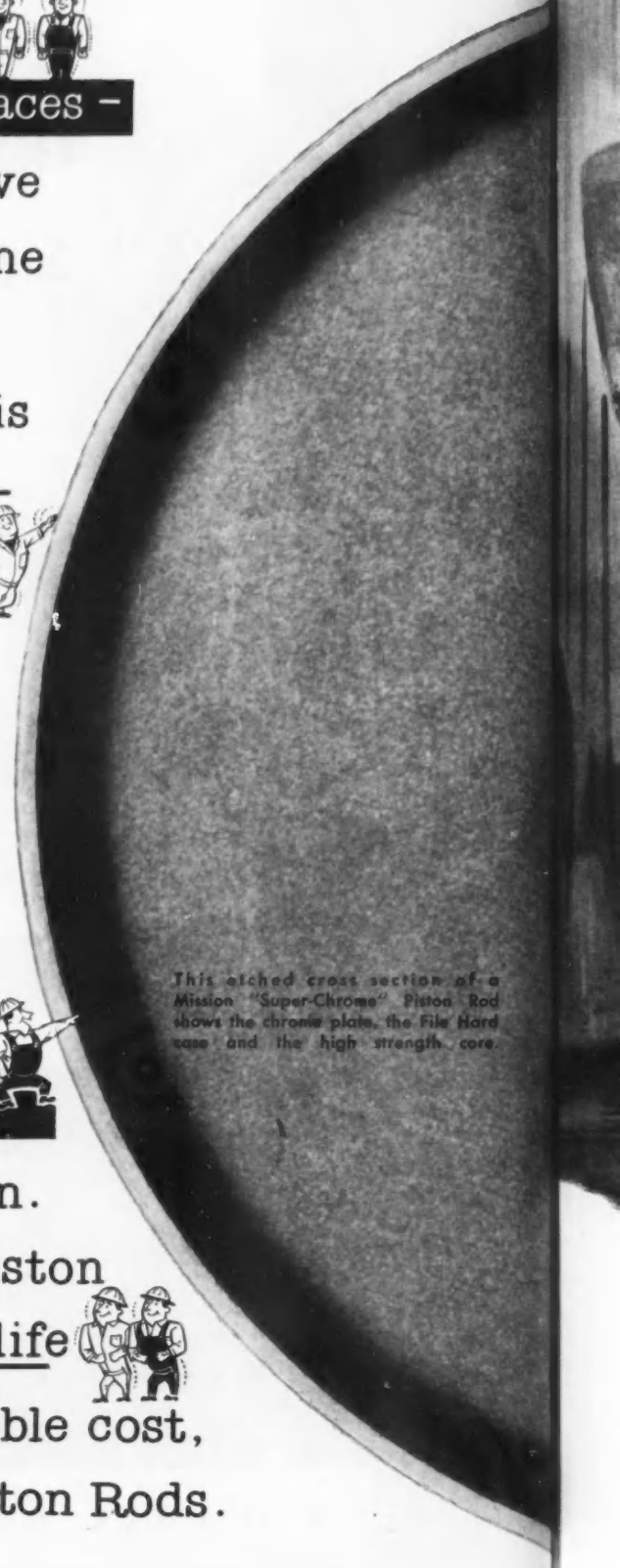
The second wearing surface is the famous

Mission File-Hard case

that will give another long run.

Mission Super-Chrome Piston Rods give more than double life

at considerably less than double cost, They are your best buy in Piston Rods.



This etched cross section of a Mission "Super-Chrome" Piston Rod shows the chrome plate, the File Hard case and the high strength core.

Available through all supply stores – everywhere.

Nothing but the finest will bear the name of MISSION MANUFACTURING CO.

MISSION MANUFACTURING CO. • P.O. Box 4209 • Houston, Texas • Cable Address–"Missco" • Export Office: 30 Rockefeller Plaza, New York
In England: MISSION MANUFACTURING CO., LTD. • 17 Hanover Square • London, W.I. England • Cable Address–"Missoman"

Slush Pump Valves • Valve Springs • Valve Seat Pullers • Pistons • Piston Rods
Liners • Gland Packings • Slips • Swabs • Centrifugal Pumps • Plug Valves

tough!

but we got the core!

It looked good . . . well logs indicated an interesting formation . . . cuttings showed traces of oil . . . could be right on pay structure, but nature had played havoc with this formation. Getting core was like pulling teeth from a grizzly. The rock was hard and fractured, it would disintegrate under any rough cutting action and jam the barrel if recovered. Alternating with the hard rock was soft material that would be washed away if exposed too long to the drilling fluid.

It took twenty cores to cut 272 feet. The longest core taken was only 25 feet, but what we lost in trips we made up for in penetration rate . . . from 2.18 to 5.40 feet per hour.

The smooth cutting action of the diamond core head obtained core we'd have lost otherwise. With a stable inner barrel little core was lost because of friction grinding and the short interval between bit and inner tube saved the soft core from being exposed too long to the drilling fluid.

Out of the 272 feet cut, over 82% was recovered. Enough to prove the producing potential of the well.

This performance proved to us that a tough coring job is a job for Christensen Coring Equipment.

CHRISTENSEN DIAMOND PRODUCTS

1937 SOUTH 2nd WEST SALT LAKE CITY UTAH

Only diamond coring equipment gives you the greatest amount of core recovery at "Less Cost Per Foot."

WRITE FOR CATALOG

What is Jersey Standard?

PEOPLE. The more than 300,000 people who own it—merchants . . . teachers . . . farmers . . . bus drivers . . . housewives . . . people who've invested their savings in our growth. They have just received the Annual Report on the 73rd year of our company's business.

What makes Jersey Standard run? People. People in offices and in the labs, in the oil fields and refineries of our affiliated companies. People like all of us . . . who work, play, raise families.

What keeps Jersey Standard and its affiliates in business? All kinds of people — stockholders, employees and customers.

Because of all these people, we had a good year in '55. A year of searching for and finding more oil to provide light and heat, to run cars and trucks, trains and planes, buses and tractors, to make petrochemicals. A year of even greater research leading to more and better products. A year—as our Annual Report shows — of better sales and earnings, of record payments in wages and benefits to employees, of record income generated for governments in the form of taxes — a year, in short, of bigger contributions to the prosperity of the people of the countries where we do business.

If you would like a copy of our 1955 Annual Report to Stockholders, please write to us at: Room 1626, 30 Rockefeller Plaza, New York 20, N. Y.

STANDARD OIL COMPANY (NEW JERSEY) AND AFFILIATED COMPANIES

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

FOR FAST, SAFE BARGE LOADING

Clear the docks!

New CHIKSAN BARGE LOADING ARM

SAVES ON

Line Handling Injuries
Dock Clutter
Lengthy Hookup Time
Hose Bursts
Replacement Costs

This newly developed barge loading arm ends hazardous man-handling of loading hoses, eliminates dangerous dock clutter. Mechanical operation makes hookup fast and simple... one man can handle the job in minutes with no physical strain.

Ball bearing swivel joints make it possible to rotate the arm to meet varying flange locations. After arm is flanged to barge riser, it can be left unattended. Arm will automatically conform to the various positions of the barge as loading or unloading is carried out. When not in use the operation arm can be raised up and out of dockside traffic.

Write For Illustrated Literature, Dept. 6-6

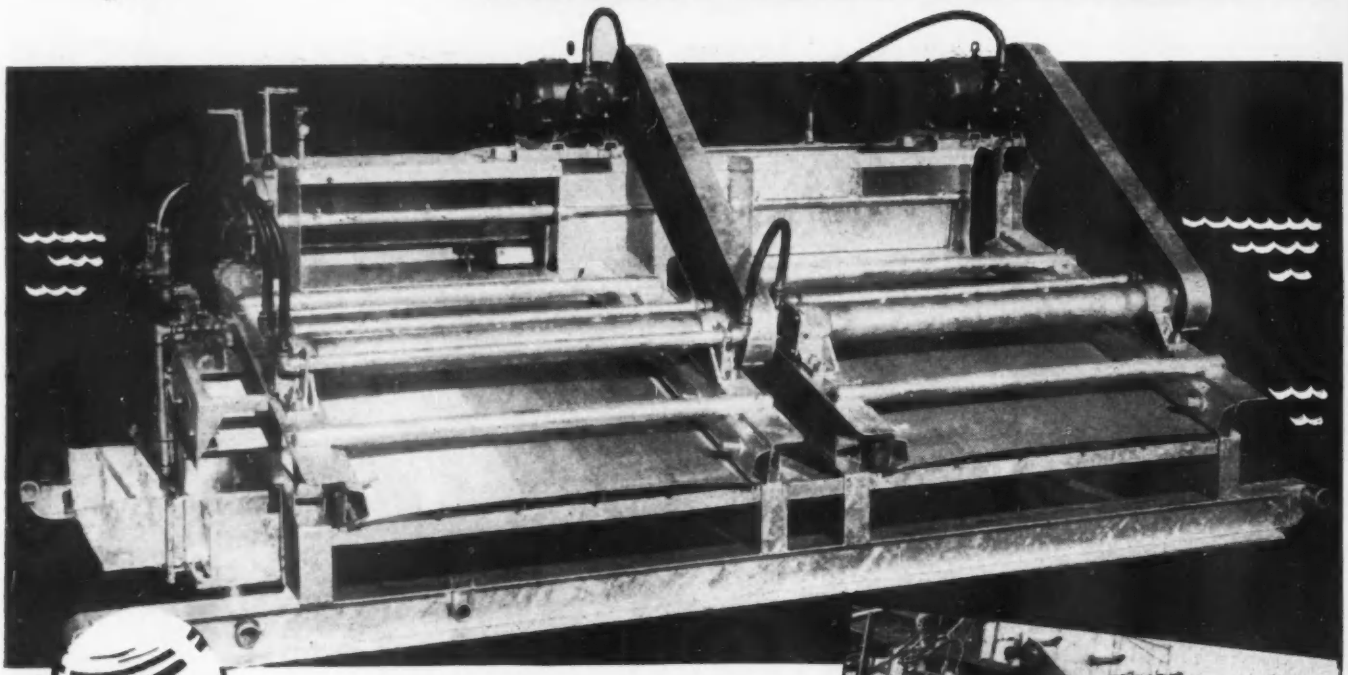
CHIKSAN

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

CHIKSAN COMPANY— BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division) Houston 1, Texas • Chiksan Export Company • Chiksan of Canada, Ltd., Edmonton, Alta.

Thompson DOUBLE VIBRATING SHALE SHAKER....



TOPS

for offshore duty

The THOMPSON DOUBLE VIBRATING SHALE SHAKER is specially engineered for off-shore barges or islands, deep wells, or wells using big volume and high pressure mud pumps. It is available either plain or *galvanized*, which makes it rust and deterioration-proof on off-shore or coastal duty.

THOMPSON Shakers are famous for their highly efficient service at any depth or flow and for their economical first cost. Very effective for removing shale and abrasives from mud, prolonging drilling tool life, and general cutting down of drilling expense. The THOMPSON Shale Shakers are easily transported and installed, using either electric, steam, gas engine or oil drive.

With THOMPSON on the job, you are assured of getting *clean mud*.

SOLD ONLY THROUGH SUPPLY STORES

Above is a front view of the THOMPSON TWIN SHAKER, which is equipped with lifting bails for easy pick-up, heavy screen beds, stationary water spray, and built-in mud box.

On the rear of the shaker is the wash basin, and tool cabinet. On the left is the famous Thompson SAMPLE MACHINE which gives the operator an important foot-by-foot sample of cuttings.

Thompson **TOOL CO.**
IOWA PARK, TEXAS

But Not SOUTHWESTERN

If you use pipe around salt water . . . or if you use pipe to dispose of salt brine . . . you know ordinary pipe quickly gives in to the ravages of corrosion . . . but not Southwestern Plastic Pipe.

Here is the pipe that can even carry caustic acids without corrosion or deterioration. It's "Rust-Proof" Pipe . . . not subject to rust, rot or electrolytic corrosion.

If salt water causes problems at your wells, or if you have any problems of corrosion, get the facts on Southwestern Plastic Oil Field Pipe.

Write today for free literature on the various types of Plastic Pipe manufactured by Southwestern. You'll find real economy now . . . but even more important is the savings for years to come. Mail the convenient coupon now.

- Non-Corrosive
- Economical Installation
- Reduces Build-up
- Less Friction Loss
- Lightweight

SOUTHWESTERN
MANUFACTURES
KRALASTIC PIPE
P. V. C. PIPE
TENITE
BUTYRATE PIPE
POLYETHYLENE PIPE
CHEM-WELD DRAIN PIPE

each type designed to do specific jobs better

SOUTHWESTERN PLASTIC PIPE CO.

look for this sign at your oil field supply store

Td. Mk. Applied For.

We are interested in Plastic Pipe for use in_____

_____

In this application, temperature will be about_____

with pressures of_____

☐ **Have Someone call on us** ☐ **Send Free Literature**

Please Print Or Write Plainly

Company_____

By_____

Mail Address_____

Town_____

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Get More Hole For Your Wire Rope Dollar with

J&L SpringKore

Rotary Drilling Lines

SpringKore's tightly coiled, high quality steel spring center was developed by J&L to give rotary drillers a wire rope with unusually high resistance to crushing action *plus* extreme flexibility.

Check these features of J&L SpringKore Rotary Drilling Lines and see why you get longer service life on your rotary rigs at lower drilling line costs.

LONG-TERM FLEXIBILITY
SpringKore's highly flexible center and wide distribution of internal pressures maintains original rope flexibility under long periods of heavy-duty service.

RESISTS CRUSHING ACTION
Coiled steel spring center has great resistance to crushing . . . snaps rope back to its original shape and diameter.

COMPLETE LUBRICATION
SpringKore's hollow center acts as a lubricant reservoir . . . reduces corrosion and friction wear by assuring lubrication of innermost parts of rope.

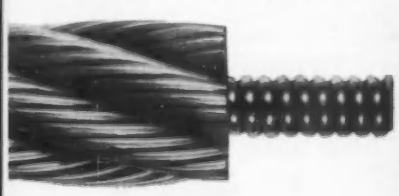
MORE SUPPORTING CONTACT POINTS
The coiled shape of the spring center gives the strands of the rope more supporting points . . . reduces friction by spreading pressure evenly over many contact points.

UNIFORM DIAMETER
The firm internal support provided by the spring center maintains uniform rope diameter . . . reduces wear caused by outer strands rubbing against each other.

LESS INSIDE STRAND WEAR
The spring center flexes under crushing instead of scoring strands . . . reduces wear on inside wires.

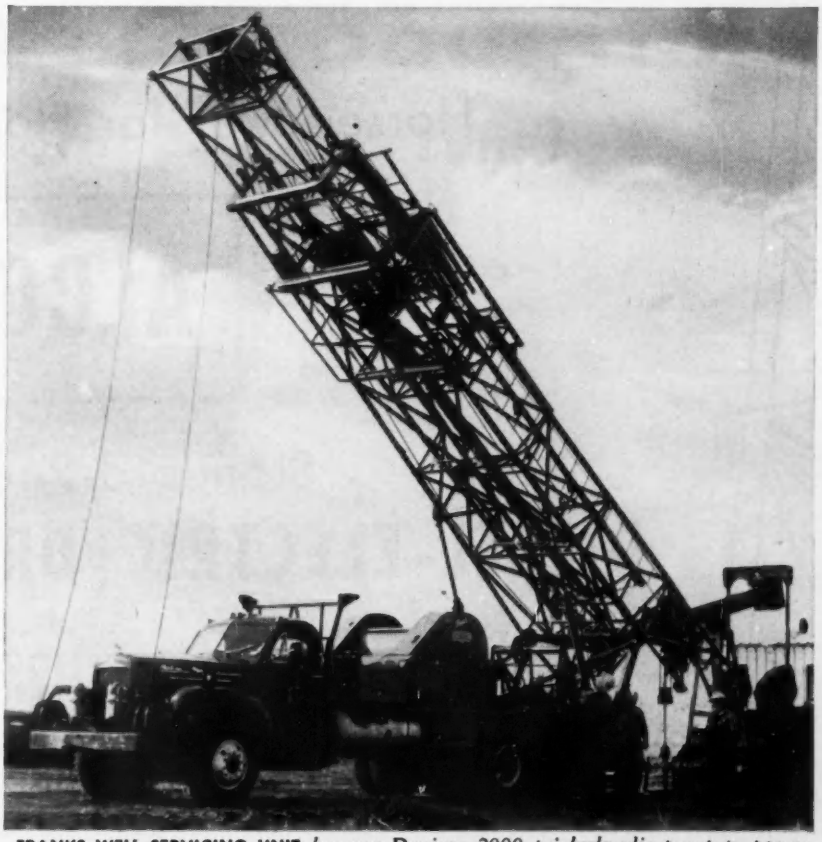
Put these SpringKore advantages to work on your rotary drilling rigs. Specify J&L SpringKore Rotary Drilling Lines. Available in standard sizes and construction.

Jones & Laughlin
STEEL CORPORATION · PITTSBURGH



J&L STEEL

Eliminates 2000 pounds dead weight with **DENISON hydraulic equipment**



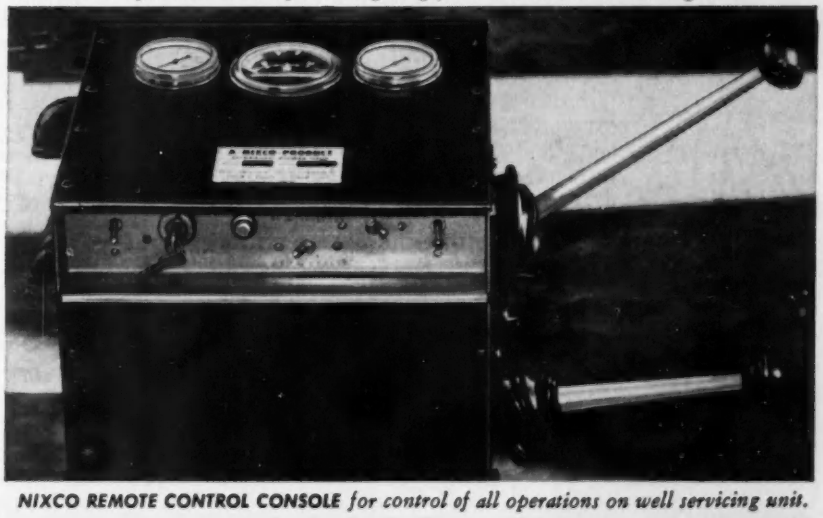
FRANKS WELL SERVICING UNIT *has one Denison 2000 psi hydraulic pump to power 3 Denison hydraulic motors for tubing tongs, rod wrench and measuring line.*

● There's 2000 pounds less weight to haul around on this well servicing unit. Here's why:

Instead of the conventional auxiliary engine driving an air compressor, a hydraulic motor now drives the air compressor that controls the hoist, winch brake, the gear shift and engine speed. A Denison hydraulic pump is now driven off the power takeoff and furnishes power to fluid motors on all types of tongs.

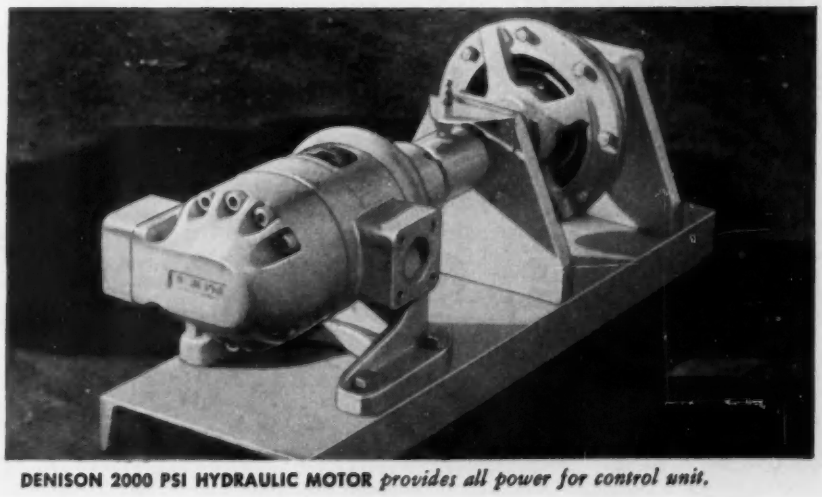
Cost of engine maintenance and fuel is eliminated.

Denison hydraulic systems offer many benefits on oil drilling operations. A Denison representative will show you how to increase dependability, save space and weight, cut costs of your equipment. Write him today.



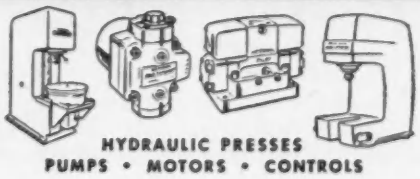
NIXCO REMOTE CONTROL CONSOLE *for control of all operations on well servicing unit.*

THE DENISON ENGINEERING COMPANY
Columbus 16, Ohio
A Subsidiary of American Brake Shoe Co.



DENISON 2000 PSI HYDRAULIC MOTOR *provides all power for control unit.*

DENISON Hydr OIL ics



HYDRAULIC PRESSES
PUMPS • MOTORS • CONTROLS

Horsepower for Horsepower . . .

ALCO

Standard-Package
DIESEL-ELECTRIC DRILLING PLANT

drills deeper, faster, more economically than any other type of power or transmission

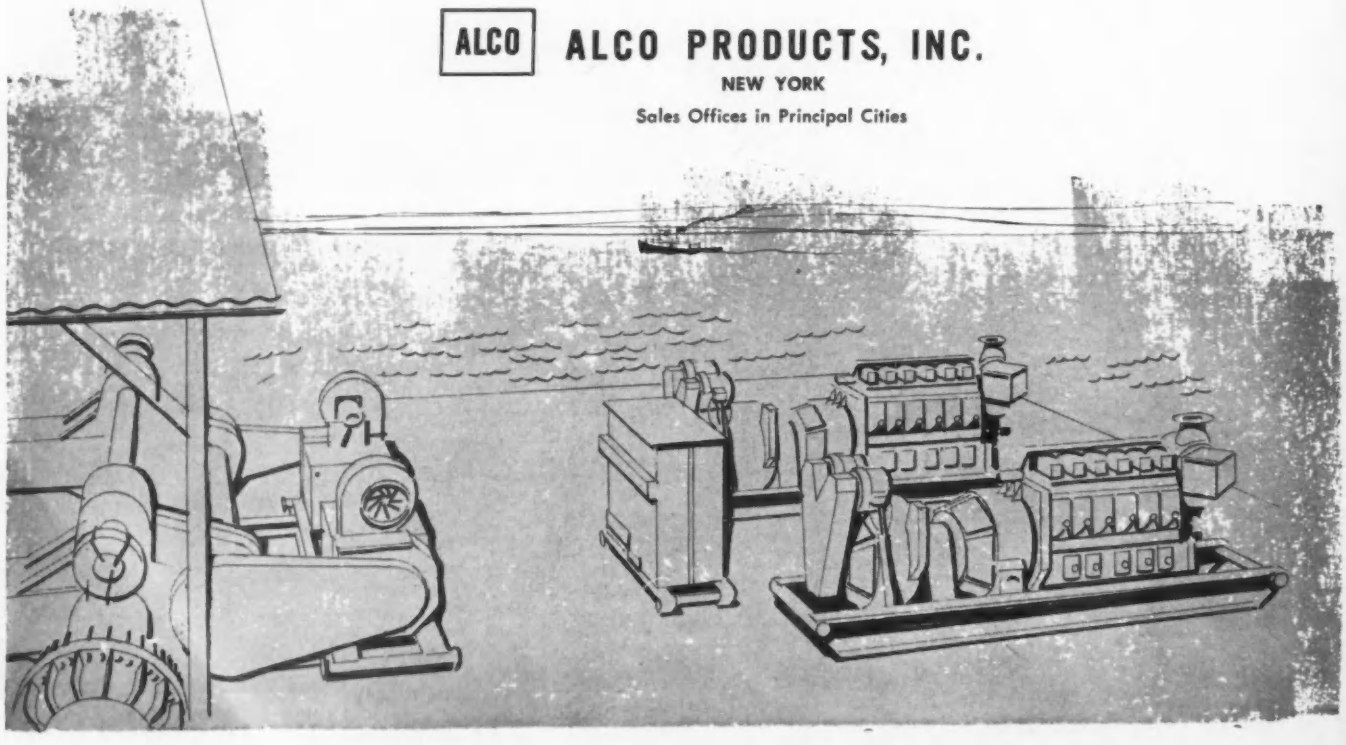
Completely self-contained, the ALCO diesel-electric drilling power package provides 100 per cent standby. No other power is required.

The basic ALCO unit provides 1370 hp for drawworks drive and 600 hp for two mud-pump drives, plus power for lighting and other auxiliaries. A wide variety of standard modifications allow for larger mud-pumps, rotary, mud-mix or coring-reel drives.

Flexibility and simplicity are prime reasons for the diesel-electric plant's economy. The driller has finger-tip control of smooth electric power for all operations, under any drilling condition. And the skid-mounted components can be moved readily from site to site.

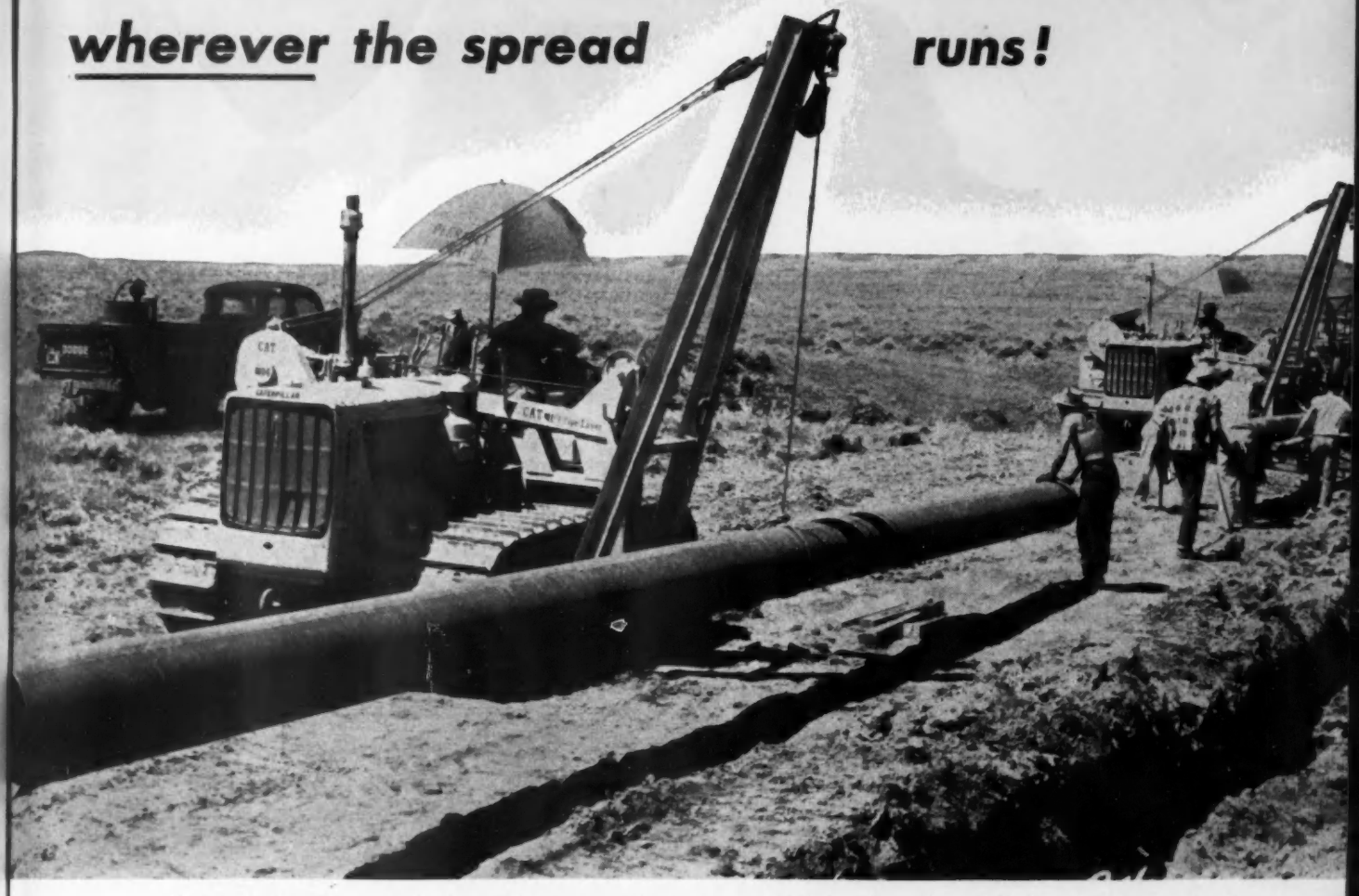
This ALCO diesel-electric drilling power package is available at a cost comparable with that of an ordinary power rig. Contact your nearest ALCO representative or write P. O. Box 1065, Schenectady 1, N. Y., for a detailed brochure.

ALCO **ALCO PRODUCTS, INC.**
NEW YORK
Sales Offices in Principal Cities



MAINSTAYS of PRODUCTION

wherever the spread runs!



In terrain like this, east of Plevna, Montana, production averaged three miles a day. O. R. Burden Construction Corp., Tulsa, Oklahoma, used an equipment line-up that was predominantly Caterpillar for money-making performance.

Along with these two CAT* MD6 Pipelayers on this spread east of Plevna, Montana, the O. R. Burden Construction Corp. relied heavily on other Caterpillar equipment for profitable production. Included in its line-up here were the following big yellow units: three D8 Tractors, four D7 Tractors, one MD7 Pipelayer, two D13000 Engines in Cleveland ditchers and a No. 12 Motor Grader.

You'll find that concentrating on Caterpillar equipment pays off *three* ways:

1 Every unit, from pipelayer to motor grader, is ruggedly constructed to stand up under the beating of pipeline construction. The MD6, for instance, has an exclusive oil-type clutch that seldom requires adjustment and lasts much longer than ordinary clutches. And its bellows sealed track rollers keep mud and dust out for longer life. These, and other Caterpillar-developed features, enable it to do *more* work at *lower* cost with *less* down time on any job.

2 Familiarity with Caterpillar's simply designed engines enables your mechanics and grease crews to handle maintenance routine with a minimum of time.

3 The network of Caterpillar Dealers makes it easy for you to handle your replacement parts problems *wherever* you are. Here's word from Burden's Spread Superintendent C. M. Hoffman about this: "Wherever our spread runs, we find Caterpillar Dealer service ready and willing to keep our Cat equipment in top operating condition."

What's more, you'll find the latest developments in pipeline equipment *first* at your Caterpillar Dealer. One example: the all-new 190 HP No. 583 Pipelayer —the first complete pipelaying unit, with a lifting capacity of 130,000 pounds maximum. For complete information on the rugged yellow line, see him today.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

USE CAT EQUIPMENT FOR MONEY-MAKING PRODUCTION

. . . the members of P

They were ready YESTERDAY

. . . ready to drill the first oil well with little in the way of equipment, but much in the way of resourcefulness.
Venturesome men, who wanted hard jobs that would test their ingenuity, naturally gravitated to this challenging task. They adapted equipment from other industries and a blacksmith made their bits and special tools. Only their bulldog determination enabled them to carry on in the face of difficulties that would discourage the less hardy.

They were rewarded for their never-say-die spirit by striking oil at 69½ feet. Thus was born the famous Drake well near Titusville in Pennsylvania in 1859.

This was the beginning of a new name for this type of man, who thrives on doing jobs that require inventiveness, courage and the tenacity to stick to jobs that would discourage men of lesser breed — "the petroleum equipment and service supplier."

They are ready TODAY

A survey showed that petroleum equipment suppliers who are members of P.E.S.A. travel 511,000,000 service miles annually, serving the great oil industry.

9,000 ENGINEERS: Another survey showed that they have over 9,000 engineers inventing, improving equipment and furnishing technical assistance in the use of tools and services. These engineers are composed of research scientists, development engineers, metallurgists, production and inspection engineers, and field service engineers.

A MULTI-BILLION-DOLLAR PLANT INVESTMENT — the value of the combined plants of the individual P.E.S.A. members—is necessary in order to supply the giant oil industry with equipment and services—*where* wanted, *when* wanted *and in the quantities wanted.*

These and many other points prove that P.E.S.A. members are doing a superlative job . . . *TODAY.*

*No matter **when** ...*

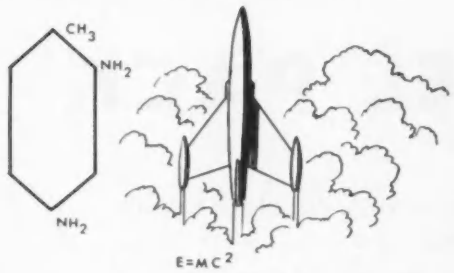
*No matter **where** ...*

*No matter **what the cost** ...*

THE OIL INDUSTRY WILL ALWAYS SAY:

"P.E.S.A.* are ready"

They will be ready TOMORROW



Just as the petroleum equipment suppliers kept pace with the amazing growth from the 69½-foot Drake well to the 4-mile-deep wells of today . . . so will they keep ahead of the requirements of a fabulous future.

The predictions of scientists for the next quarter century are breath-taking: guided missiles to haul passengers to destinations within minutes after their take-off . . . thawing the Arctic and Antarctic into productive use . . . making the deserts flourish . . . greatly extending the use of nuclear physics in producing oil . . . metals and methods that will enable the drilling of wells to depths that will overshadow the progress made in the past . . .

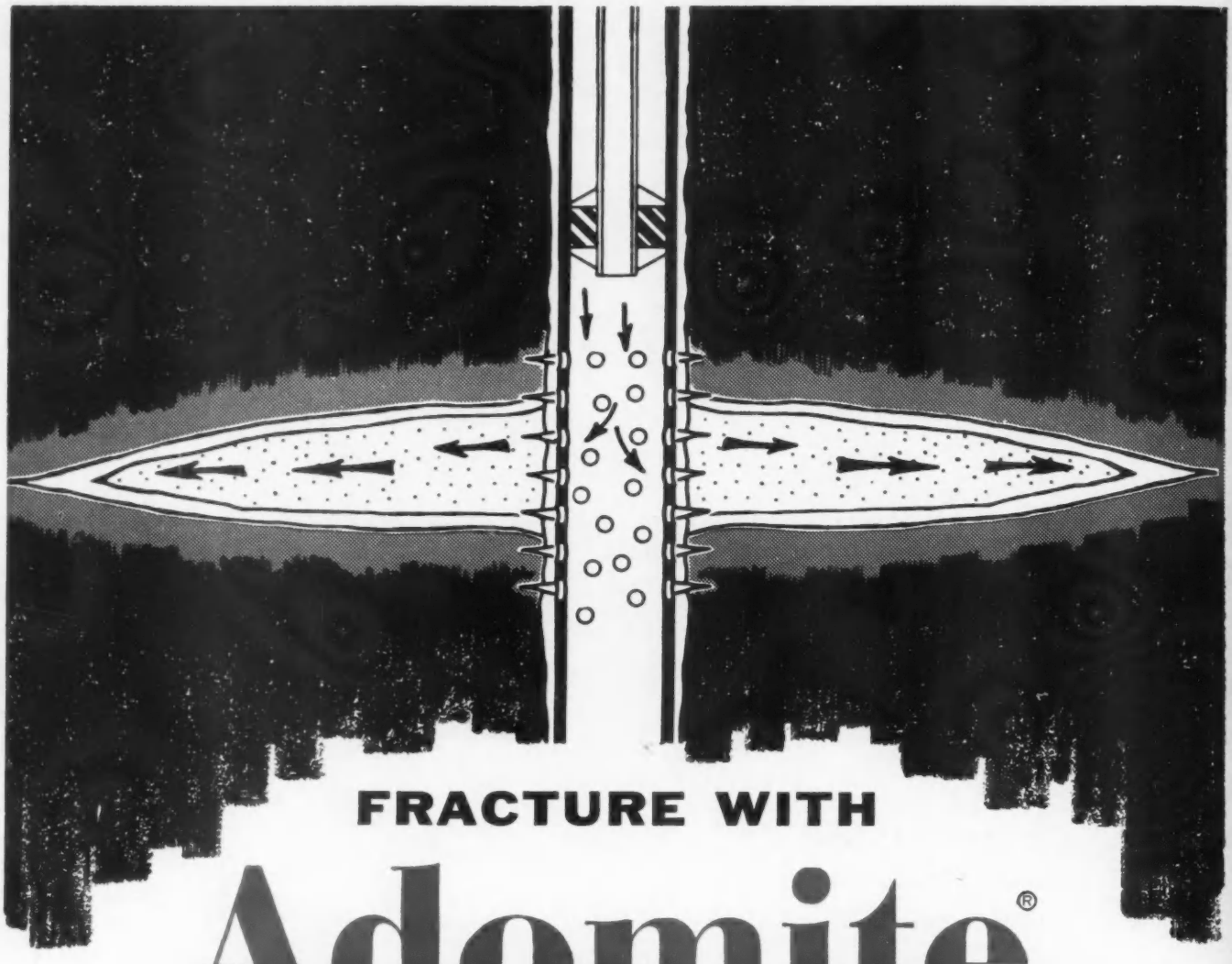
No matter *when*, *where* or *what*, *P.E.S.A.* members will be *ready*.

P.E.S.A.*

Petroleum Equipment Suppliers Association

Composed of: manufacturers whose plants make the finest precision equipment . . . supply stores who add two other ingredients of value — where you want it — when you want it . . . service companies who make available to their customers the practical results of the theoretical research of some of the most brilliant scientific and technical men in the world.

CUT FLUID LOSS TO A MINIMUM



FRACTURE WITH

Adomite®

Specify the fluid-loss control agent proven profitable in thousands of successful field treatments

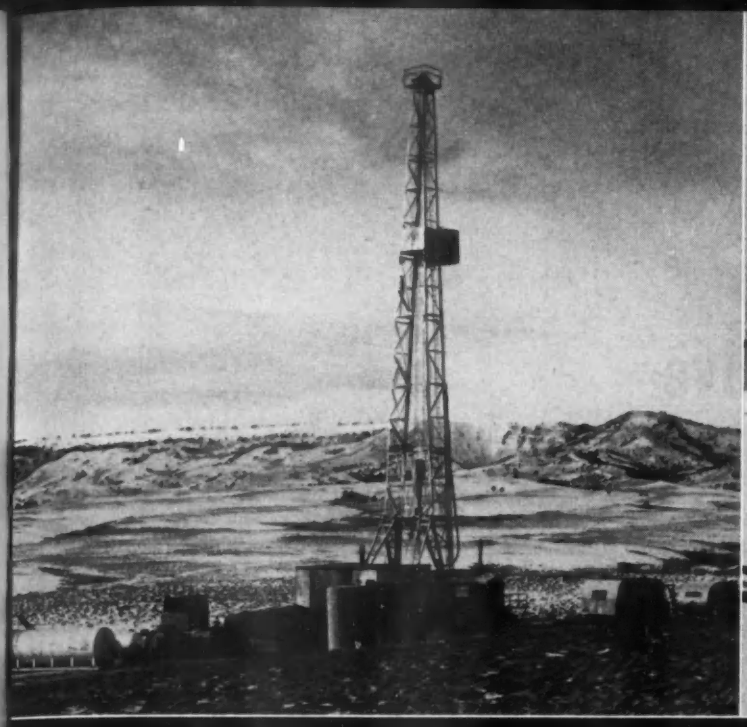
Only Adomite gives you all these advantages— so effectively	Larger fracturing per volume of treatment—or the same size fracture with a lesser volume of fracturing oil.	Acceptance of fracturing fluid by pipeline companies —fracturing oils made from lease crude and Adomite are completely acceptable to pipelines.	Fewer sand-outs. Adomite prevents loss of fluid into the rock matrix, preventing buildup of sand concentration in the fracture.
Lower transportation costs. The fracturing oil costs you nothing when you use your own lease crudes.	Decreased friction losses. The low viscosity of Adomite-treated crudes or gelled crudes permits the use of less pumping equipment than viscous refinery residuals.	Compatibility of fracturing fluid with reservoir oils. Since Adomite is used with lease crudes, the fracturing fluid is fully compatible.	Fluid loss control with one additive. Adomite is all you need to control fluid loss of kerosene, crudes, gelled crudes or refinery residuals.

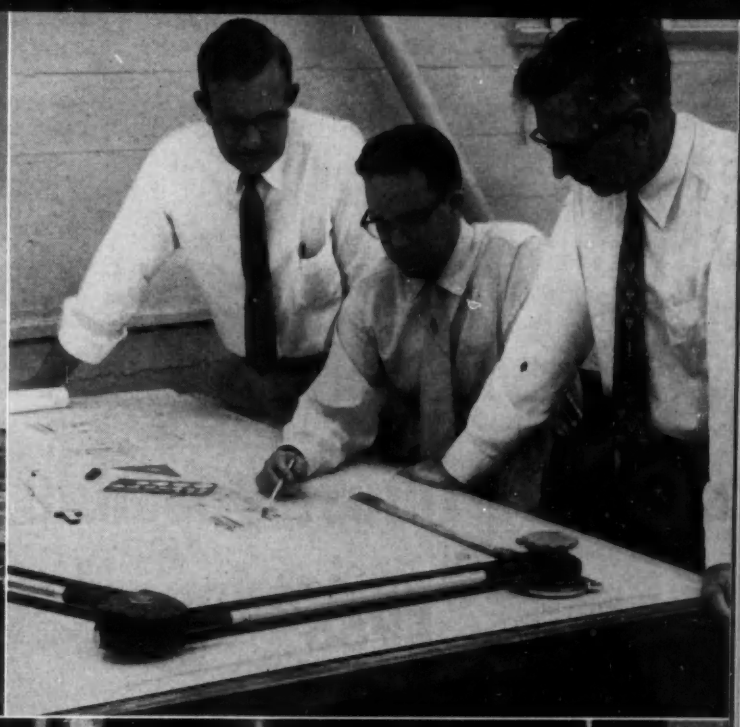
© 1956, Continental Oil Company

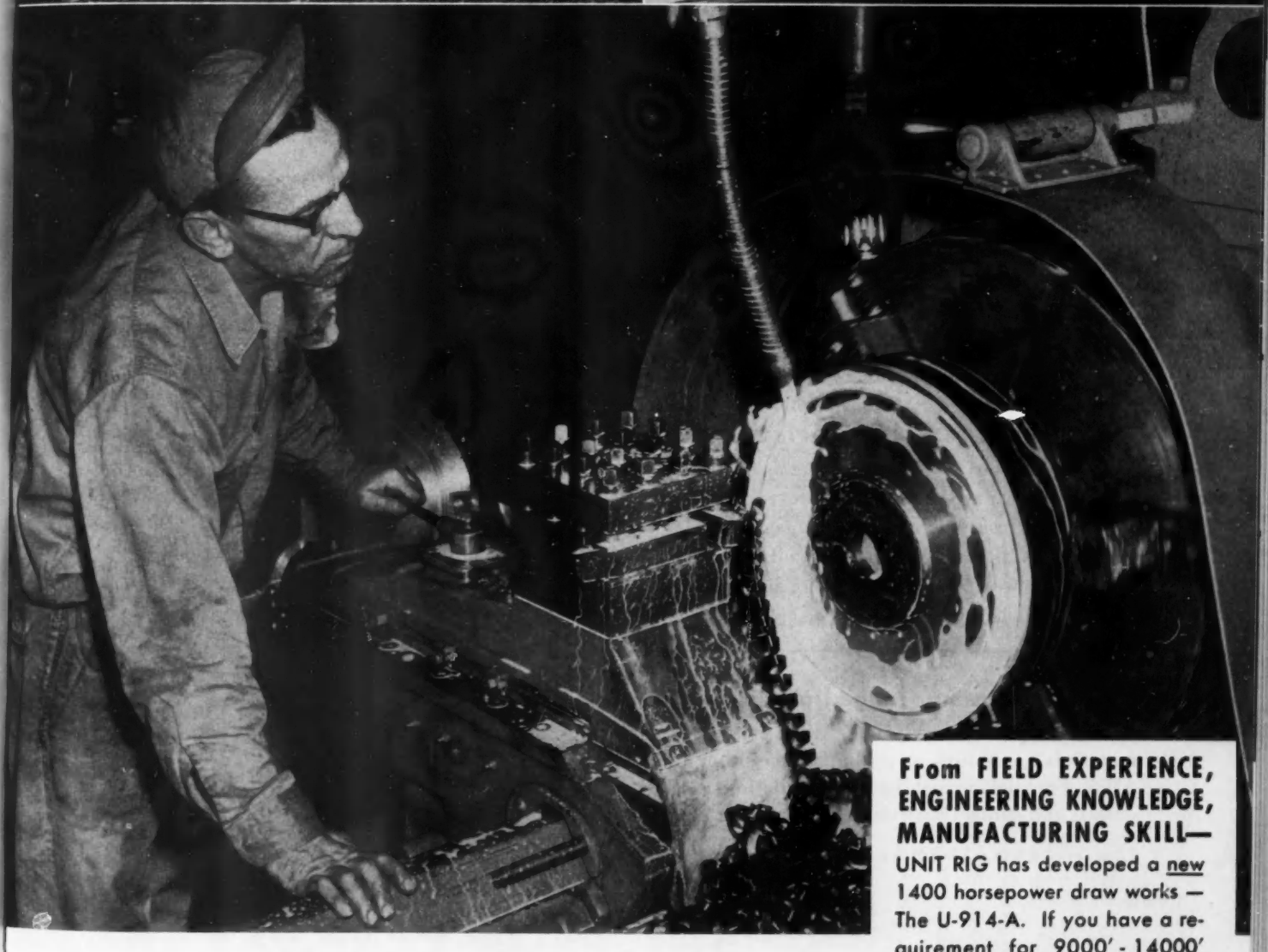
BE SURE TO TELL YOUR SERVICE COMPANY TO USE ADOMITE

Adomite—developed and manufactured by Continental Oil Company

Adomite®—trade-mark, Continental Oil Company







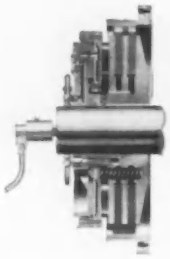
From FIELD EXPERIENCE, ENGINEERING KNOWLEDGE, MANUFACTURING SKILL—

UNIT RIG has developed a new 1400 horsepower draw works — The U-914-A. If you have a requirement for 9000' - 14000' drilling, see this exceptional new draw works before you buy.

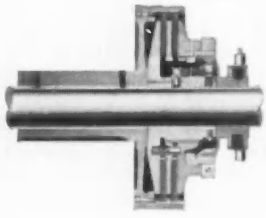
UNIT RIG & EQUIPMENT COMPANY / TULSA, OKLAHOMA

Dependability First!

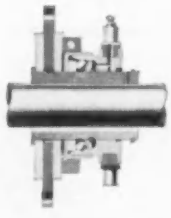
DODGE CLUTCHES



DODGE AIR-GRIP—quickest acting, most responsive air clutch available. May be "inched" or thrown into full engagement, as required. Built-in quick release valves, optional. Unique design and automatic internal ventilation insure cooler operation, longer life. Provision for mechanical engagement if air supply fails. Single and double plate types.



DODGE DIAMOND D—ruggedly built of highest grade materials, to resist wear and withstand shock loads. Smooth, trouble-free operation. Relatively light force on shifter is converted into a heavy power transmitting pressure between friction surfaces. One point shifting mechanism. Compact, completely enclosed for safety and protection from dust. Precision-built in sizes rated from 20 to 330 hp at 100 rpm.



DODGE ROLLING GRIP—simple and compact in design—no toggles. All working parts easily accessible. Power transmitting pressure on friction disc is developed by circle of hardened steel balls forced into wedge-shaped groove by the sliding cam. Flexible, easily controlled, extremely rugged. Single and double friction plate designs, sizes .38 to 21.2 hp at 100 rpm.

Write us now for Bulletins on Dodge Clutches.

DODGE
of Mishawaka, Ind.

Call the Transmissioneer, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write us.

DODGE MANUFACTURING CORPORATION, 6500 UNION ST., MISHAWAKA, INDIANA

You are cordially invited to attend
the Formal Opening of our
NEW BANKING HOUSE

SUNDAY, JUNE 17, 1956

Dedicated to serve the growing financial needs of those who are building the great Southwest.

Bank of the Southwest

NATIONAL ASSOCIATION, HOUSTON

RESOURCES OVER 300 MILLION DOLLARS • MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

THE SOLUTION: COREXIT—

Humble's Proven Corrosion Preventives

Among the Humble *Corexit* formulas, several are designed to meet the many unusual requirements for corrosion prevention in gas condensate wells and their allied operations. In wells where temperatures and pressures are high, *Corexits* have proven especially effective; and can be used safely under these conditions.

Your operating costs will be lower when you use *Corexit* because fewer well pulling and work-over jobs are necessary, and the life of your equipment is prolonged.

For complete information on *Corexit,* see your nearest Humble wholesale plant in Texas and New Mexico, or write or phone:

Technical Service
Sales Department
Humble Oil & Refining Company
P. O. Box 2180
Houston 1, Texas.

HUMBLE

HUMBLE OIL & REFINING COMPANY

SR-602

Confucius say:

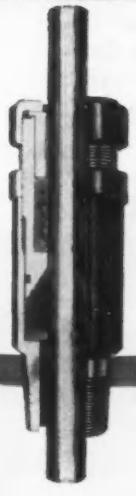
"Don't be a sucker!
ALL sucker
rods are NOT
alike!"

for utmost corrosion—
resistance, top quality
and long-lasting performance
you can't beat

A trip through the world's most modern sucker rod plant, the D+B plant at Garland, Texas will convince you that all sucker rods are not alike. Designed, built and tooled solely for the production of sub-surface pumping equipment, this plant combines 50 years of know-how with carefully-controlled manufacturing operations by expert workmen using special machines. It will pay you to get D+B sucker rods from your nearest CONTINENTAL or D+B store.

D+B

SUCKER RODS



Save Time and Money with the New and Improved

DUAL-PAC STUFFING BOX

For ease of replacing the packing without killing the well, long wear, and a tight seal on the polished rod, you can't beat this time and money saving stuffing box.

CONTINENTAL

Serving the Oil and Gas Industries

CONTINENTAL SUPPLY COMPANY

A Division of The Youngstown Sheet and Tube Company

General Offices: Dallas, Texas

Representatives in all principal oil fields of the world

D+B
- DEEP WELL PUMPS
- SUCKER RODS
- COUPLINGS

EMSCO

REG. U. S. PAT. OFF.

D+B DIVISION

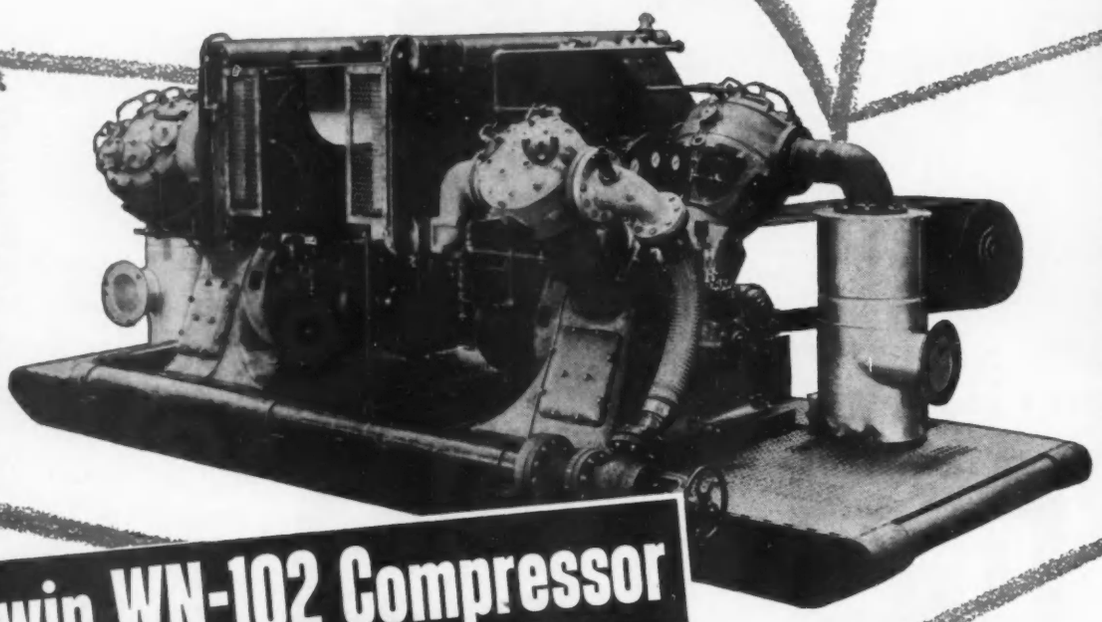
EMSCO MANUFACTURING COMPANY

Garland, Tex. • LOS ANGELES, CALIF. • Houston, Tex.

General Sales Offices: Dallas, Texas

SR-602

Air Drilling Package =



JOY Twin WN-102 Compressor

Move it in . . . belt it to the drilling engine . . . and begin drilling. That's all it takes to be "in business" with the Joy Twin WN-102. Here's the rundown on *why* the Joy Twin WN-102 is the ideal compressor for your air and gas drilling operations:

- *It is portable . . . mounted on a heavy, oil-field-type skid.*
- *It supplies up to 1512 cubic feet of actual air per minute at pressures up to 200 psi . . .adequate for most drilling jobs.*
- *It is driven by V-belts from the auxiliary mud-pump sheave on the drilling engine . . . requires no additional power in most cases.*
- *It is compact enough to be within highway limits when moving between drilling sites.*
- *It's designed for the job . . . only Joy supplies a heavy-duty, water-cooled package type compressor for this application.*

The Twin WN-102 is but one of the many outstanding Joy compressors which are applicable to air and gas drilling. In the complete Joy line you are certain to find just the compressor to do your job.

For complete information, write, giving full details on requirements, to **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 48-30

Consult a Joy Engineer

FOR AIR COMPRESSORS • MOTORIZED DRILL RIGS
GAS GATHERING COMPRESSORS
PORTABLE LIGHTING LINES

WSW 05944-48

JOY

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

HOW TO LOWER PRODUCTION COSTS:

Power your pumper

WITH *Ajax* and *Gas*

The fog of questions about rising production costs and narrowing profit margins can be swept away by a single sunlit fact: you can usually save half the cost of your engine each year with AJAX and gas! After two years, you have only negligible maintenance and fuel to pay for—from then on out, years of continued profit. More facts? Write us—see your Supply Man!

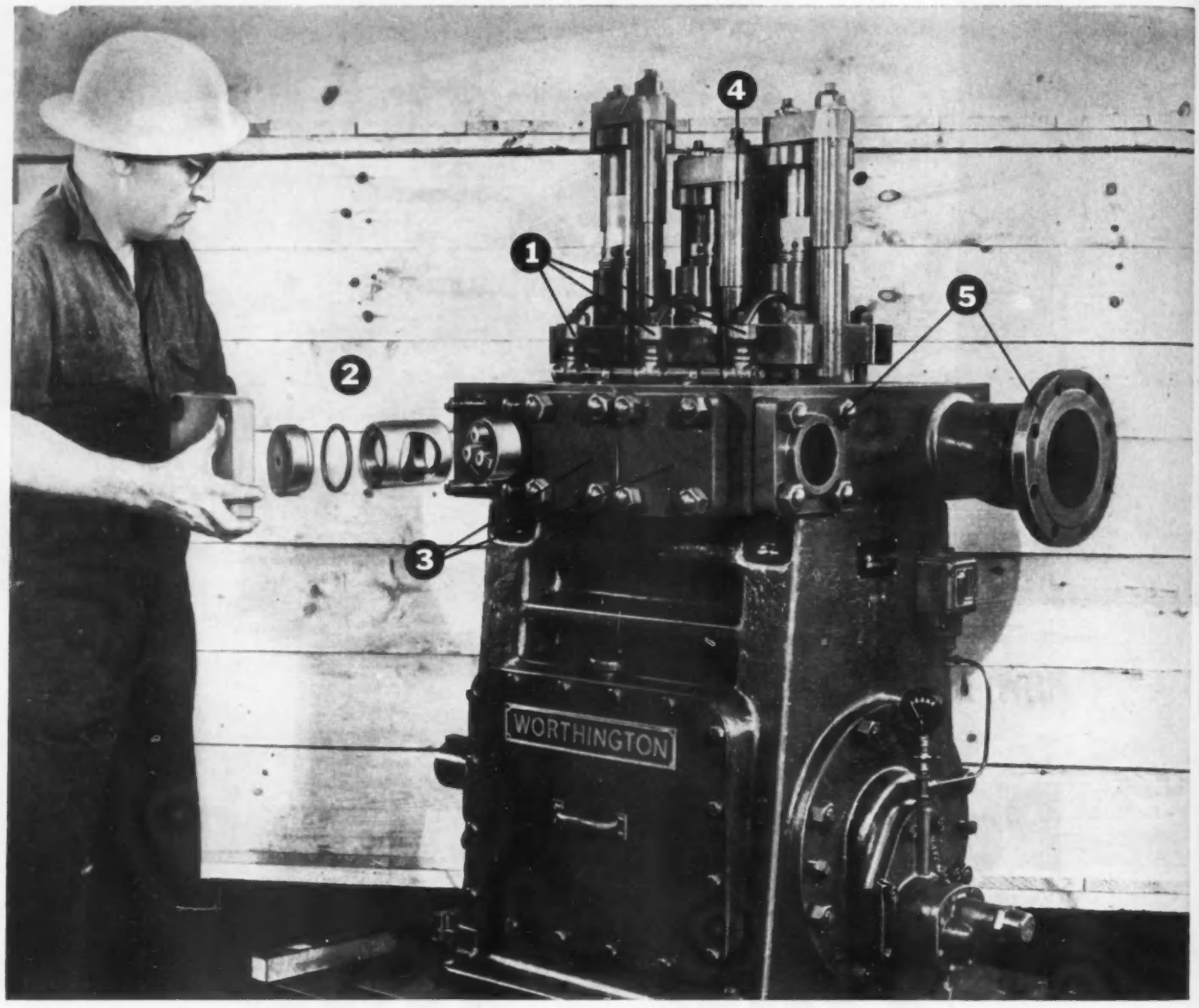
AJAX

Ajax IRON WORKS

Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA. • R. B. MOORE SUPPLY CO., BOLIVAR, N. Y. • BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA



Check These 5 Waterflood Pump Features

Compare with any other! Operates for years at peak efficiency; easy to work on in the field.

Men who run waterflooding operations say the ideal pump should be (1) rugged—to operate continuously for five to ten years, (2) dependable—for peak efficiency and (3) highly accessible—for fast maintenance.

See for yourself how Worthington's waterflood pump—with five exclusive features—measures up.

It licks corrosion. Barrels are protected by exclusive feature #1—*separate drains* which carry off stuffing box leakage and prevent it from accumulating on cylinders. The cylinder is made of forged steel (or aluminum bronze) which is rugged enough to stand up for years under corrosive oil field salt water, regardless of pressure.

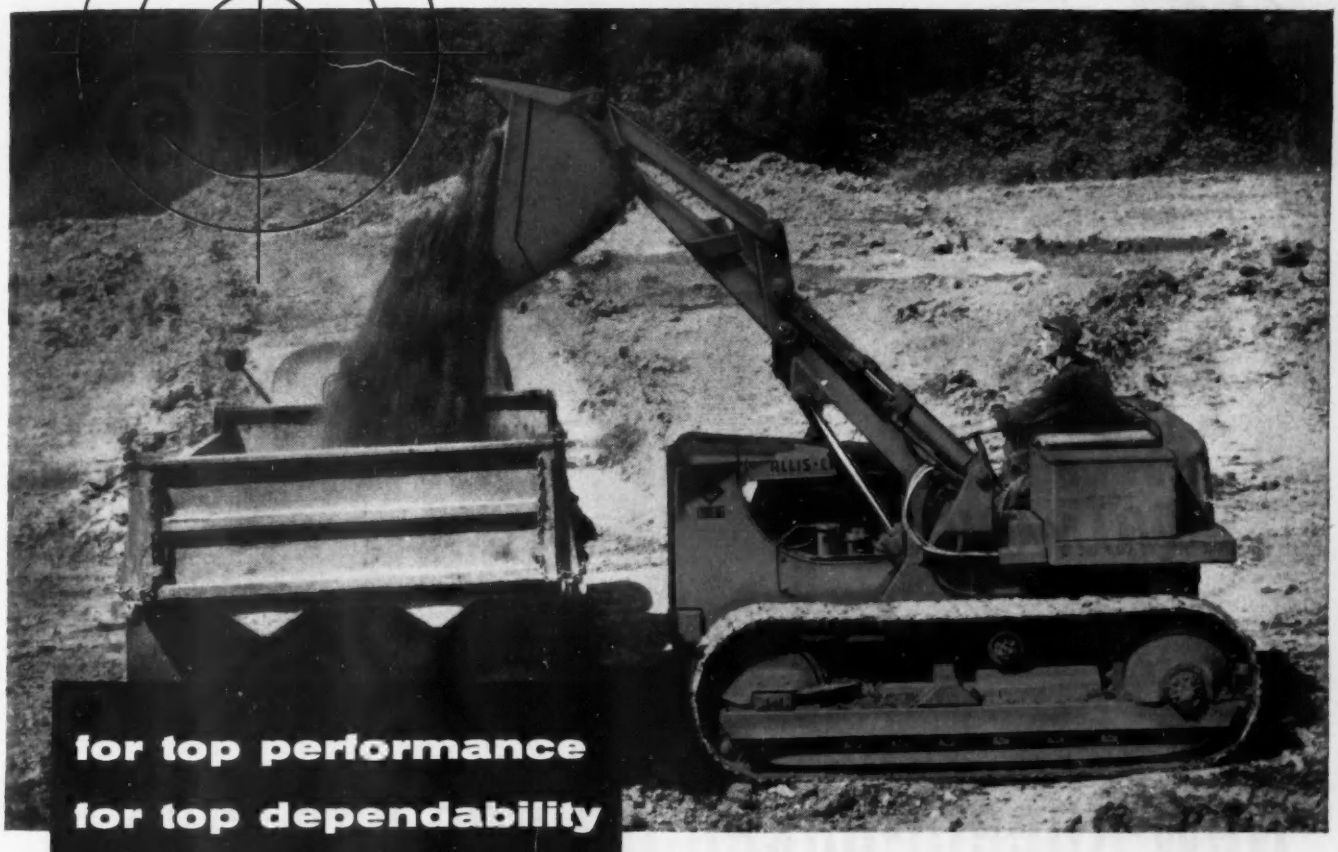
A Worthington pump is dependable for peak waterflood efficiency. It will run at reasonably low suction heads without rough or noisy operation because of feature #2, *double ported valves* which give greater flow through a given seat diameter.

And it's easy to work on in the field. *Individual valve covers,* feature #3, permit you to inspect and service valves in half the time (without breaking pipe connections). *Interchangeable stuffing box barrels,* feature #4, let you change pump capacity in less than an hour. *Flanged suction and discharge* openings, feature #5, make piping easy to connect or disassemble.

Add them up. For a rugged, dependable, accessible waterflood pump, your choice has to be . . . Worthington! Get the full story from your nearest Worthington District Office, or write to Section P61, Worthington Corporation, Harrison, N. J. P.6.1

WORTHINGTON

Set your sights on an HD-6G



for top performance
for top dependability
for top versatility

Loading backfill into trucks
Padding and backfilling trenches
Cleaning up right-of-way
Hauling equipment
Miscellaneous loading and handling jobs

1½ yd bucket **55 belt hp** **19,600 lb**

and all these exclusive on-the-job advantages important to both owners and operators . . .

Allis-Chalmers long-life diesel engine — power that handles tractor and bucket demands with ease.

Heavy welded-steel shovel side frames and low stabilizer — provide greater strength, low center of gravity, outstanding visibility.

Full-flow filtering — filters oil three ways, provides long-life protection for hydraulic system.

Six truck-wheel stability — almost 7 ft of track on the ground for superior balance.

1½-yd two-position bucket — handles big loads efficiently in loose material or hard-packed dirt.

All-steel, box-A main frame — soaks up shock loads, protects the entire power train.

One-piece steering clutch and final drive housing — line-bored for true alignment of shafts and gears.

Straddle-mounted final drives— with bearings on both sides of gears to maintain correct gear tooth alignment.

Simplified lubrication (including 1,000-hour lubrication intervals on truck wheels, idlers and support rollers) provides extra working time.

Unit construction—makes service easier, faster. Major units can be removed without disturbing adjacent assemblies.

Plus husky wrap-around radiator guard . . . simplified piping . . . heavy-duty truck frames . . . heavy-duty, roller-bearing truck wheels . . . matchless control . . . and the convenience of 24-volt direct electric starting.

Check the complete service program offered by your Allis-Chalmers construction machinery dealer. His factory-trained servicemen, factory-approved facilities, and stocks of True Original Parts keep your equipment operating properly . . . provide the kind of service that saves you money. See him soon; he'll be glad to show you an HD-6G at work.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

Rough treatment proves

New Rheem-baked linings can take it

Traveling's hard on shipping drums—even when they don't show it.

Riding under a blistering sun one day, drums may be standing in snow the next. They get bounced and banged around—not always *hard*, but certainly *often*. All this shock adds up.

Rheem engineers stay a jump ahead of the problem. They speed up road abuse in "torture" labs by testing drums filled with actual products at various temperatures.

We've found that linings applied in extra-careful ways stand up better and longer under punishment. That's why we use 2-oven baking to cure our linings. Drums have a *"stand-up"* oven for more even baking. Their tops and bottoms have a separate oven. It's fussy detail, we know, but curing is a critical step in applying our linings. And we take lots of other fussy steps before the curing—like shot-blasting our steel drums to physically clean and roughen them—to give the linings a lasting, "fingered" grip.

These steps have all come out of a search for new and better linings—new and better protection—for all kinds of products. A *continuing* search by the world's leading producer of steel shipping containers.

E. D. C. B. A.

Have a hard-to-hold product? Chances are our lab has a lining just right for you. They have A to Z experience in solving lining problems. Write today.

RHEEM MANUFACTURING COMPANY

5001 Jefferson Hwy., P.O. Box 4027, Carrollton Station, New Orleans 18, La.
1025 Lockwood Drive, Houston 20, Texas

NAME_____

COMPANY_____

POSITION_____

STREET_____

CITY_____ ZONE____ STATE_____

PRODUCT_____

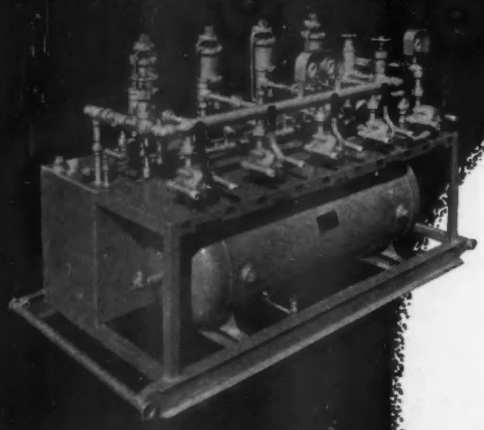
WO-6

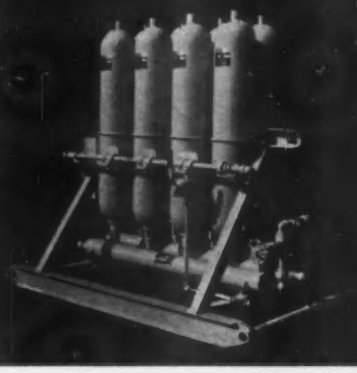
YOU CAN RELY ON Rheem MANUFACTURING COMPANY

RICHMOND AND SOUTH GATE, CALIF.; HOUSTON, CHICAGO, NEW YORK, NEW ORLEANS; LINDEN, N. J. AND SPARROWS POINT, MD.

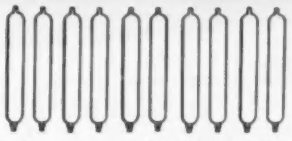
NEW CONTAINER STEEL SHIPPING CONTAINER INSTITUTE

Get Maximum Blowout Protection for your rig with-



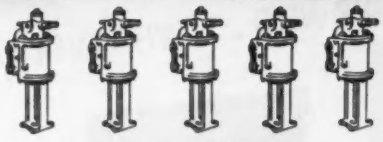


KOOMEY
Blowout Preventer
CLOSING UNITS
and
S.& S. "Power Packaged"
ACCUMULATORS



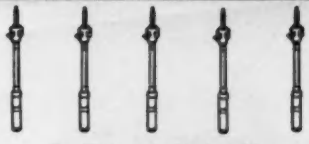
3 TO 10 ACCUMULATORS

Individual ten-gallon accumulator bottles (3000 psi working pressure) in manifold to form a compact system that will operate even if several of the nitrogen filled bags within the bottles should fail.



2 TO 5 MOTORS

Heavy duty units which require no oiling or maintenance . . . completely separated from pumps for ease of repair and to eliminate danger of material being pumped seeping into motor.



2 TO 5 PUMPS

Each double action pump assembly is operated by a separate motor and each motor and pump assembly is capable of closing the rams of a blowout preventer independently.

QUICK PUMP CHANGE

All a roughneck need to do to change pumps is break one union, substitute an exchange pump and tighten the union. Thoroughly tested, guaranteed pumps are available for exchange.

REMOTE CONTROLS

Added safety is provided by dual controls — one set on the rig floor and the other at a safe distance from the rig.

COMPLETE INFORMATION AVAILABLE

Detailed information on all models plus service instructions, parts descriptions and performance specifications and an easy-to-use model selection guide are contained in a new 44-page catalog. Write today for your copy.

STEWART & STEVENSON DISTRIBUTING CO.

STEWART & STEVENSON DISTRIBUTING CO.

1719 PRESTON AVENUE • P. O. BOX 1637

HOUSTON, TEXAS

MAIL COUPON TODAY

STEWART & STEVENSON DISTRIBUTING CO.
P. O. Box 1637, Houston, Texas

Please send me a copy of your illustrated catalog on Koomey Blowout Preventer Closing Units.

Name_____

Firm_____

Address_____

City_____ State_____

McNAMAR-JOY COMPRESSORS

the ideal complete packaged unit

MORE ECONOMICAL FIELD GAS COMPRESSOR

McNAMAR-JOY units offer features that save the operator money on initial installation and operating costs—whether used for gas lift, boosting gas to pipeline, repressuring-pressure maintenance or in gasoline plants, etc. Units are extremely portable, have high operating flexibility, and all parts are most accessible for maintenance-repair. Pressures to 2000 psi and horsepower to 400.

WHATEVER YOUR NEED . . . WHEREVER YOUR NEED

AIR DRILLING HAS SLASHED DRILLING COSTS!

McNAMAR-JOY packaged compressor units have the portability necessary for field service in the drilling industry yet have all the proven ruggedness and dependability required for continuous duty. They are portable . . . light weight . . . still rugged. For faster, cheaper drilling with air, be sure to buy the right kind of compressor — a McNAMAR-JOY. Available with your choice of gas or diesel engine.

McNAMAR-JOY COMPRESSORS

may be purchased on easy terms.

Also available on rental

or rental-purchase option basis.

McNAMAR

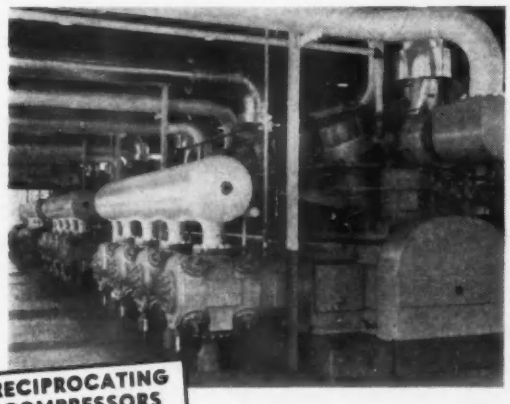
BOILER AND TANK COMPANY

BOX 868 • COMPRESSOR DIVISION

PH. CH 2-6291 • TULSA, OKLA.

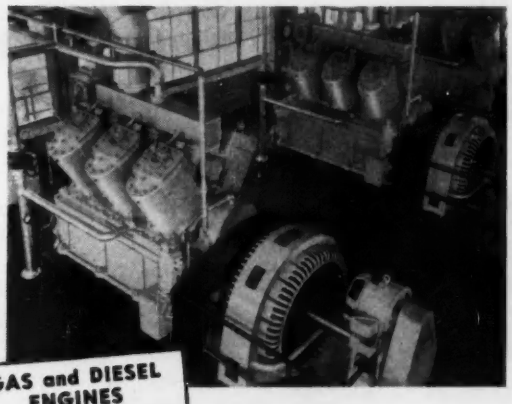
You can depend on IR equipment

. . . because it's "job-engineered" with design, construction and materials to meet each application



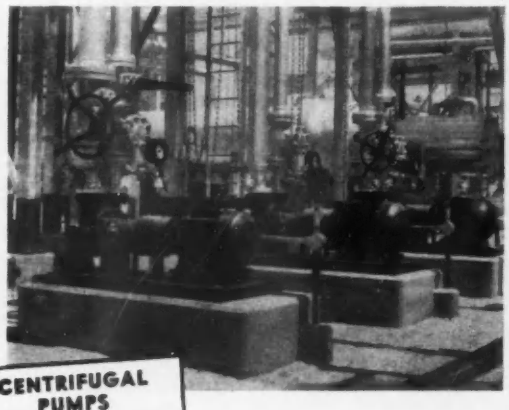
RECIPROCATING COMPRESSORS

Thousands of successful installations have established the dependability of I-R compressors. A complete line is available for handling air and other gases . . . for all types of drive including integral 4-cycle engine-driven units. Sizes range from ½ to 6000 hp; pressures to 35,000 psi.



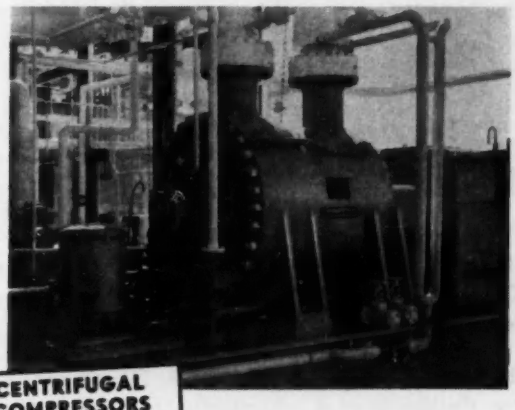
GAS and DIESEL ENGINES

For generating power and for driving pumps, blowers and other types of rotative equipment, Ingersoll-Rand builds a complete line of 4-cycle, V-angle gas engines and 4-cycle, cylinders-in-line diesels. Turbo-charged and naturally aspirated models available in sizes up to 2000 hp.



CENTRIFUGAL PUMPS

For moving liquids in refineries and through pipe lines, Ingersoll-Rand offers a complete line of centrifugal pumps. Single and multi-stage, horizontal and vertical units are available . . . many with built-in mechanical seals. Sizes for all pressures and capacities; for hot and cold liquid service; for all types of drive.



CENTRIFUGAL COMPRESSORS

A complete line of single and multi-stage centrifugal compressors and Turbo-Blowers is made by I-R for catalytic cracking, reforming processes, pipe-line service and for other air and gas applications. Capacities to 160,000 cfm; pressures to 2200 psi. Horizontally split and barrel types are available.

Ingersoll-Rand

11 BROADWAY, NEW YORK 4, N. Y. 14-311

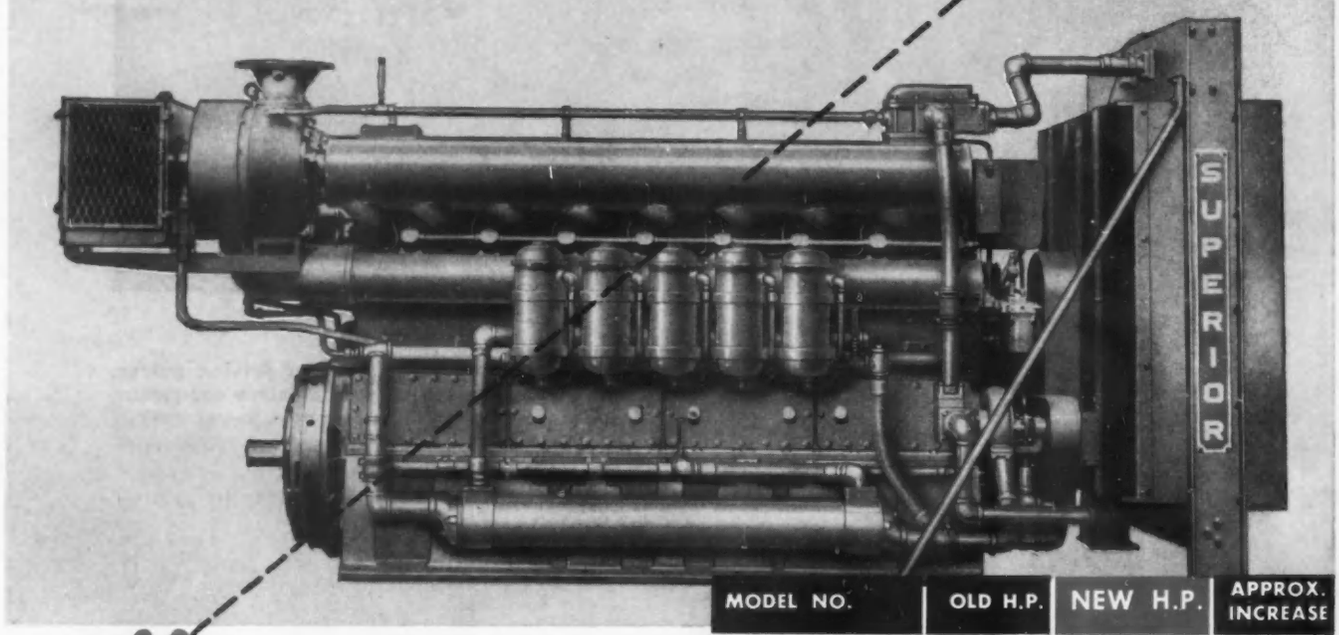
Here's a suggestion: Ask your nearest Ingersoll-Rand engineer to tell you more about I-R equipment and how it can best meet your requirements. There are very few phases of petroleum production, refining and transmission that can't benefit in some way from the proved economy and dependability of I-R equipment.

COMPRESSORS . CONDENSERS . PUMPS . DIESEL ENGINES . AIR AND ELECTRIC TOOLS . VACUUM EQUIPMENT

White's NEW SUPER PTD gives you

30% MORE POWER*

. . . and more cost-saving features!



MODEL NO.	OLD H.P.	NEW H.P.	APPROX. INCREASE
Super PTD-6	280	364	30%
Super PTD-8	375	485	29%
Super PTDS-6	460	560	22%
Super PTDS-8	620	750	21%

*CONTINUOUS WORKING HORSEPOWER

Maintaining Superior's conservative rating. Including fan and all other accessories. Continuous at 900 RPM. No correction necessary to 1500 feet elevation and 90° F.

Now, White's newly improved Super PTD Diesels give you even more drilling engine advantages than ever before! You get greater power with no increase in size . . . resulting in less weight and less cost per horsepower! You get greater working ability . . . more lugging power for easier hoisting, and faster acceleration for quicker round trips and for fast pipe handling. They have plenty reserve power too for emergencies, and enable you to get more power from fewer engines on multiple engine rigs.

Super PTD's provide power comparable to other engines having more cylinders . . . thus, the more simple design with fewer cylinders and internal parts offers outstanding advantages in requiring fewer replacement parts and lower maintenance and repair costs.

White's new design and engineering advances have also achieved even greater dependability, smoother operation, increased engine life and highly improved engine efficiency. Get all the facts from leading rig manufacturers, or through White Diesel representatives available in all oil field areas, or through White Diesel Engine Division.

Superior ENGINES · ATLAS Imperial DIESEL ENGINES · White DIESEL

WHITE DIESEL ENGINE DIVISION

THE WHITE MOTOR COMPANY • *Plant and General Offices: Springfield, Ohio*

ROSS EXCHANGER

goes along with this Joy Gas Compressor "Package"

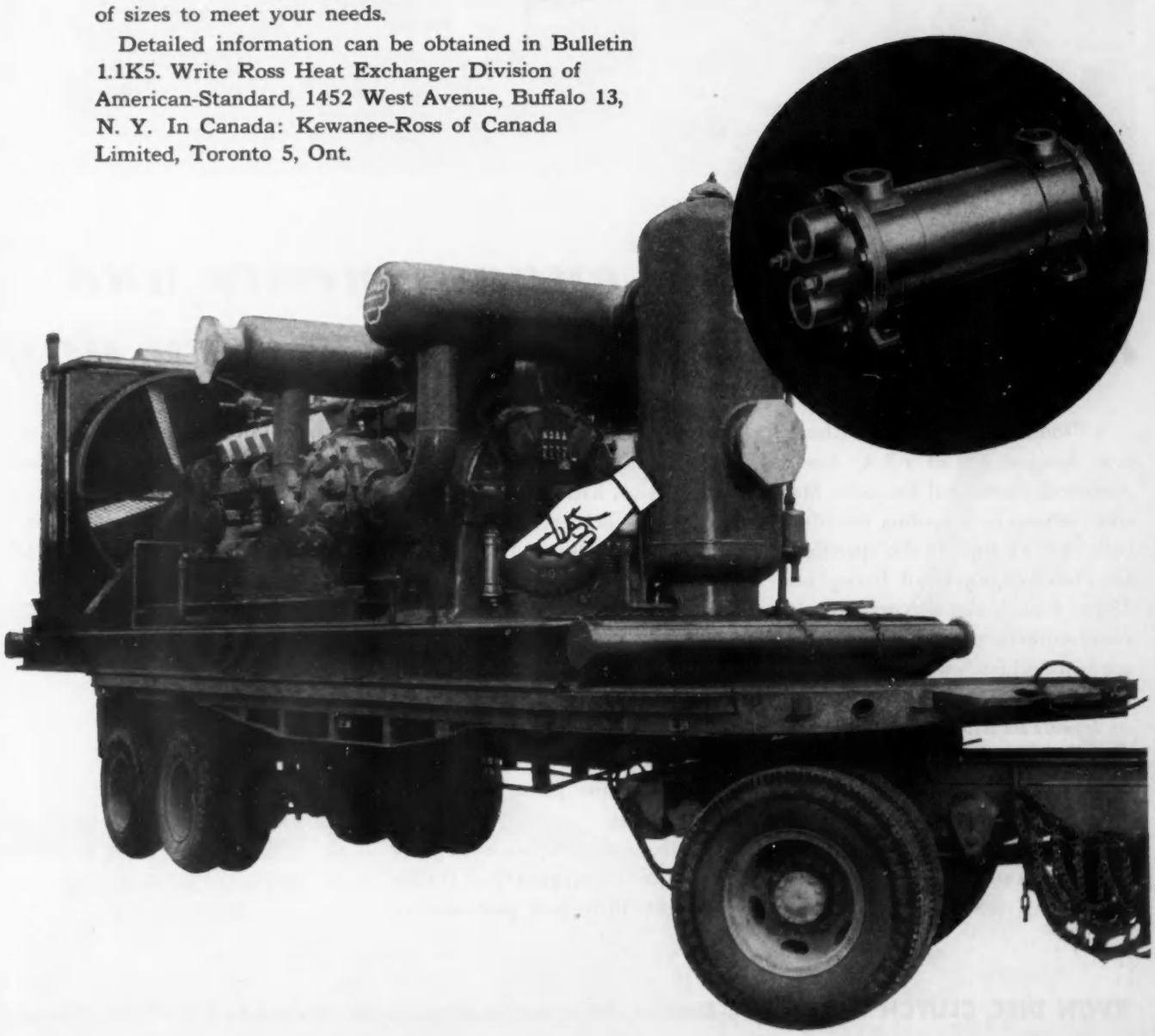
Skid mounted for portability, this self-contained, *Packaged* Joy Gas Compressor is ready to pipe up on arrival at its destination.

Furnished as part of the package, is a Ross Type BCF Exchanger. Lube oil at the correct temperature will be supplied to vital areas, at all times . . . one of the compressor's features insuring long, trouble-free service.

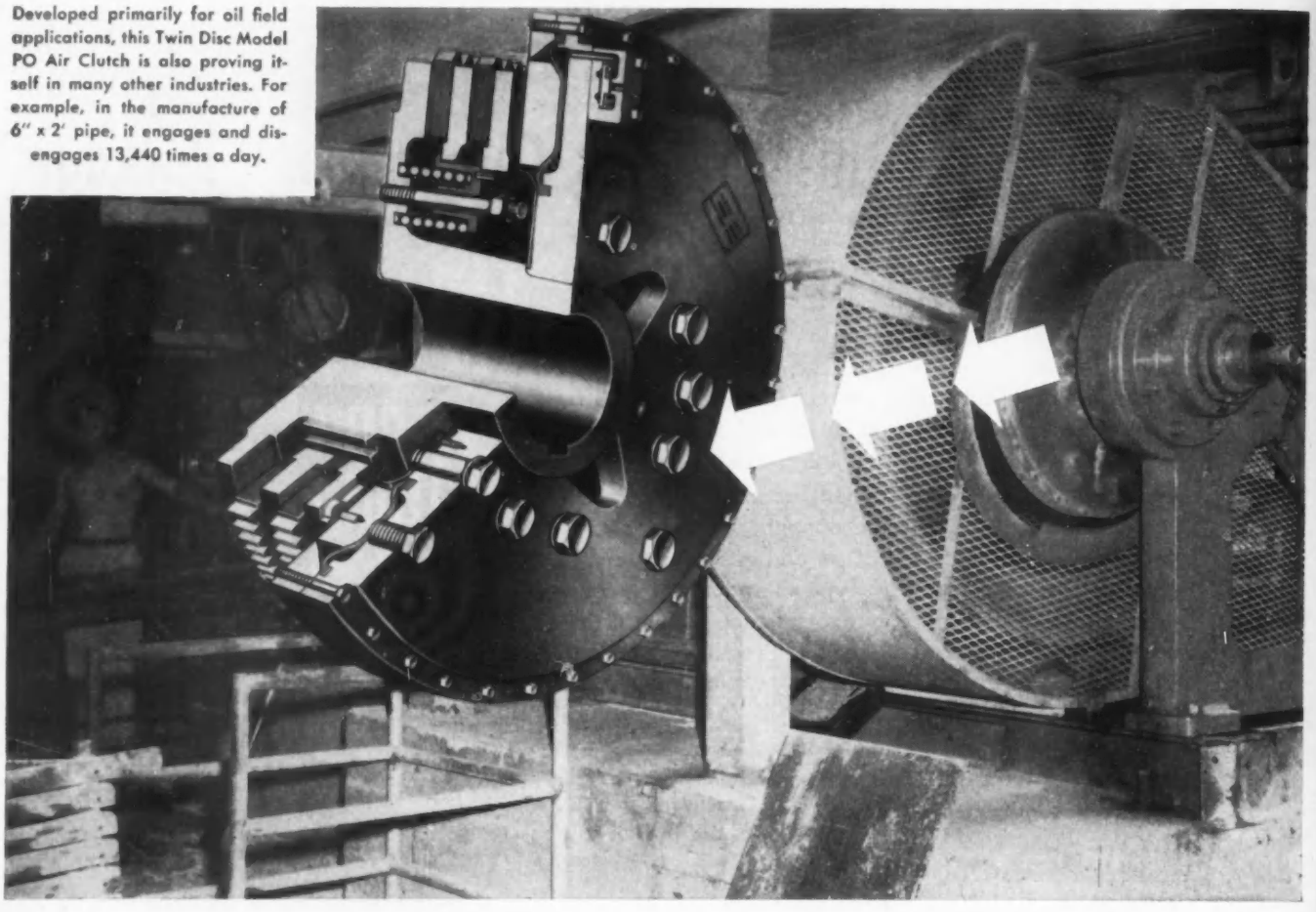
Compact, rugged Ross Exchangers are unrivaled for thermal efficiency . . . reason enough, for their continued selection by manufacturers of oil and gas equipment . . . in fact, of practically every type of industrial machinery that requires temperature control of lube oil, jacket water, hydraulic fluid and fuel oil. Pre-engineered and fully standardized, they are built in a wide range of sizes to meet your needs.

Detailed information can be obtained in Bulletin 1.1K5. Write Ross Heat Exchanger Division of American-Standard, 1452 West Avenue, Buffalo 13, N. Y. In Canada: Kewanee-Ross of Canada Limited, Toronto 5, Ont.

ROSS | ROSS HEAT EXCHANGER PRODUCTS



Developed primarily for oil field applications, this Twin Disc Model PO Air Clutch is also proving itself in many other industries. For example, in the manufacture of 6" x 2' pipe, it engages and disengages 13,440 times a day.



13,440 clutch engagements and disengagements a day...every day

A Twin Disc Model PO Air Clutch is an *integral* part of a J. C. Steele Automatic Horizontal Extrusion Machine — used by a leading manufacturer of 6" x 2' pipe. In this operation, the clutch engages and disengages *13,440 times a day* — every day . . . many more times than the most severe use in the oil fields would require. *In ten months of continuous operation, no trouble whatsoever has been experienced and no maintenance has been required.*

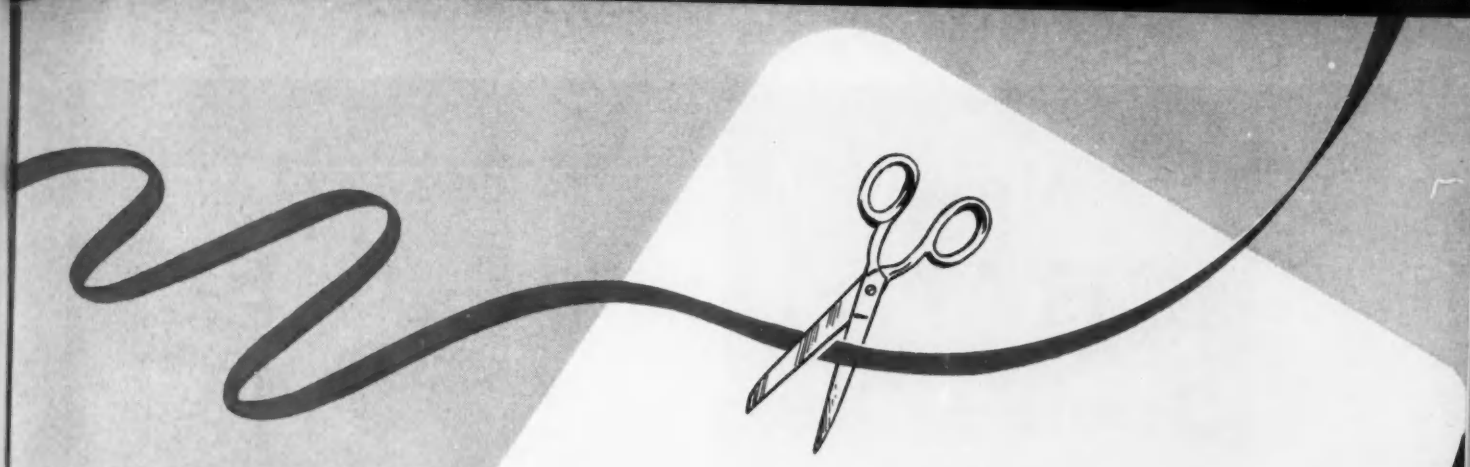
Developed specifically for heavy-duty installations, the Twin Disc Model PO's advanced design features offer many outstanding advantages, including plenty of *reserve* capacity . . . more *compact control* of power transmission without complicated linkage . . . higher torque capacity (up to 126,600 lbs. ft.) . . . *faster, smoother operation* under all working conditions . . . *positive, quick release*—no seal drag—built-in pressure release valves . . . long, trouble-free operating life, with extra-large passages from cored back plate providing "air flow" cooling to the diaphragm insulator plate, springs and driving plates.

For more information, *more proof* on how the Twin Disc Model PO Air Clutch fits in to *your particular oil field applications,* call the nearest Factory Branch . . . Tulsa: 505 Enterprise Building, Sixth and Boston, Gibson 7-1578. Dallas: 1511 Turtle Creek Boulevard, Riverside 3014. Los Angeles: 2950 Leonis Boulevard, Logan 8-3309 . . . or write Twin Disc Clutch Company, Racine, Wisconsin. Request Bulletin 304.

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Friction Clutches and Fluid Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division) Rockford, Illinois



. . . RED TAPE can be cut at WILSON SUPPLY CO.

The Drilling and Producing Industry moves fast—

decisions are often made quickly . . . time is important.

Wilson Supply Company is large enough to meet

every demand for performance proven products and service—

yet small enough to make rigid policies unnecessary.

Some Red tape may be a part of every business—

but Red tape **can** be cut at Wilson Supply Company.

"WHAT YOU WANT—WHEN YOU WANT IT"

BRANCH STORES

TEXAS: Alice, Corpus Christi, Victoria, McAllen, Bay City, Columbus, Barbers Hill, Liberty, Beaumont, Kilgore, Sherman, Odessa. LOUISIANA: Lake Charles, New Iberia, Houma, Harvey, Shreveport.

SALES OFFICES

DALLAS SHREVEPORT SAN ANTONIO
TULSA NEW ORLEANS LAKE CHARLES
CORPUS CHRISTI MIDLAND

MAIN OFFICE and WAREHOUSE—1301 CONTI ST.

WILSON SUPPLY CO
HOUSTON, TEXAS

Now...a New advance in...

Gauge Safety!

Another step ahead in Marsh Gauges: the new Marsh "Safecase". Down to the final detail this gauge is developed for those applications where an unexpected surge of heavy, explosive over-pressure can occur.

In the "Safecase" a solid metal barrier protects the entire face. But, still more important, the *entire back* of the gauge is a thin, ductile plate, designed to open out when subjected to abnormal pressure. Back plate is held firmly to the case by two holding screws and cannot be dislodged by a pressure blowout.

In exhaustive tests it has never been possible to shatter the crystal or create any other dangerous condition in a "Safecase" gauge with its safety-release back. The accompanying illustration shows the result of one of a series of tests in which blank cartridges were fired in the back of the case without even breaking the crystal. Think what that means in safety to operating men!

Yes, an important development . . . but merely the kind you would expect from the manufacturer who originated the "Connoweld" tube, the "Marshalloy" case, the Mastergauge movement and practically all of the major advancements in pressure gauges. Ask for up-to-the-minute information.

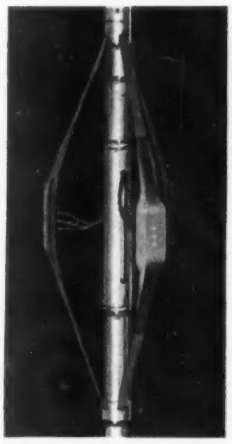
Pressure of explosive force merely opens out safety back

Instead of depending on blow-out plugs, entire back of Safecase Gauge is designed to yield to over-pressure. Photo at left shows actual result of firing cartridge within back of case. Safety-release back exhausted pressure. Front remained intact.

MARSH INSTRUMENT CO.
Sales affiliate of Jas. P. Marsh Corp.
Dept. K, Skokie, Ill.
HOUSTON BRANCH PLANT:
1121 Rothwell St., Sect. 15, Houston, Texas
Marsh Instrument & Valve Co. (Canada) Ltd.,
8407 103rd St., Edmonton, Alberta, Canada

"THE STANDARD OF ACCURACY"

MARSH GAUGES



YOU CAN GET A WEALTH OF ACCURATE INFORMATION with the SCHLUMBERGER CONTINUOUS DIPMETER

A THREE-IN-ONE SERVICE
Combining
THE DIPMETER,
THE DIRECTIONAL
AND THE MICRO-CALIPER SURVEYS

This improved Schlumberger **three-in-one** Dipmeter will do more than any similar service to help solve your structural, stratigraphic and production problems. It gives you these never-before-available money saving advantages:

A Directional Survey and a Micro-Caliper run simultaneously with the Dipmeter **at no extra cost.** All are necessary for accurate dip resolution, but they also give you additional information valuable in the completion of your well.

Sharp formation detail is obtained by using MicroLog curves for bed correlation. This increases the accuracy of dip calculations, particularly on low angle dips.

The continuous record makes it possible to accurately locate fault zones.

All measurements are recorded at the surface, thus eliminating the down-hole directional film.

It operates efficiently in high temperature wells.

It saves many hours of valuable rig time by giving you three operations in one continuous run. You can be sure of your Dipmeter Survey if it is run by Schlumberger.

THE EYES OF THE OIL INDUSTRY **SCHLUMBERGER**
Well Surveying Corporation

50th Anniversary

Associated Business Publications

PETROLEUM REFINER is an active member of the Associated Business Publications which this year is celebrating its Golden Anniversary. We take this opportunity proudly to re-affirm our belief in the high publishing principles for which the Association stands and to assure our readers that we will ever "consider, first, the interests of the subscriber."

THIS WE BELIEVE . . .

Code of Ethics **- - -**The publisher of a business paper should dedicate his best efforts to the cause of business and social service, and to this end each member of the Associated Business Publications pledges himself:

1. To consider, first, the interests of the subscriber.

2. To subscribe to and work for truth and honesty in all departments.

3. To endeavor to be a leader of thought in his editorial columns, and to make his criticisms constructive.

4. To encourage all constructive efforts to improve the standards and quality of advertising.

5. To avoid unfair competition.

6. To determine what is the highest and largest function of the field which he serves, and then to strive in every legitimate way to promote that function.

WORLD OIL

Published by Gulf Publishing Co.

3301 BUFFALO DRIVE, HOUSTON 1, TEXAS

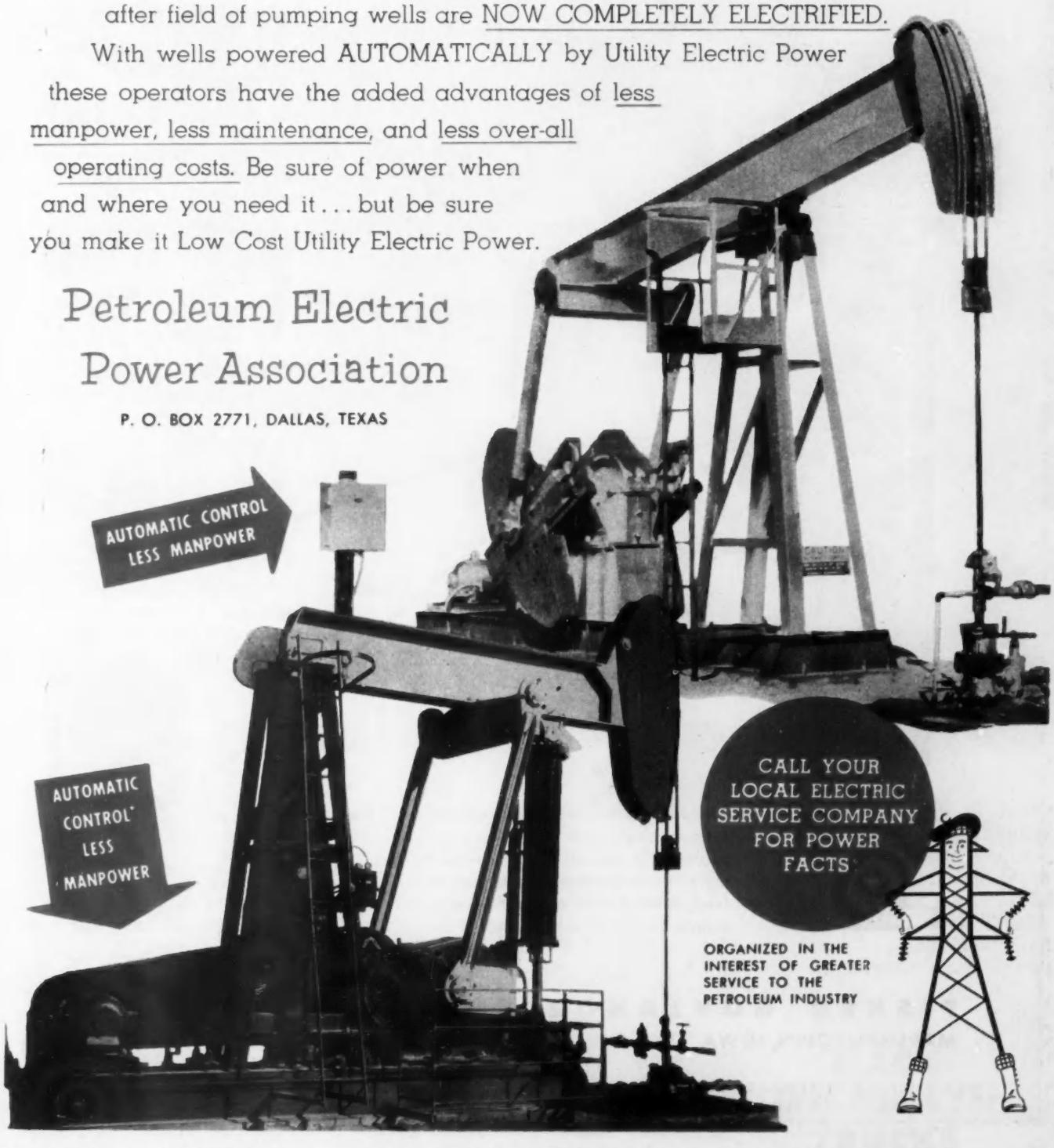
You can do it CHEAPER with UTILITY Electric Power

Multiply These Installations by Thousands...

and you'll readily see why operators favor Utility Electric Power. Field after field of pumping wells are NOW COMPLETELY ELECTRIFIED. With wells powered AUTOMATICALLY by Utility Electric Power these operators have the added advantages of less manpower, less maintenance, and less over-all operating costs. Be sure of power when and where you need it... but be sure you make it Low Cost Utility Electric Power.

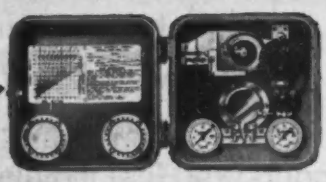
Petroleum Electric Power Association

P. O. BOX 2771, DALLAS, TEXAS

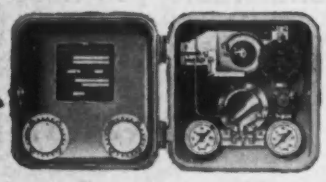

AUTOMATIC CONTROL LESS MANPOWER
AUTOMATIC CONTROL LESS MANPOWER
CALL YOUR LOCAL ELECTRIC SERVICE COMPANY FOR POWER FACTS
ORGANIZED IN THE INTEREST OF GREATER SERVICE TO THE PETROLEUM INDUSTRY

FISHER®
LEVEL-TROL
The Answer to Your Liquid Level Needs

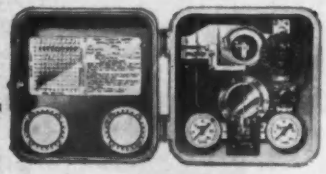
TYPE 259B—Level-Trol cage unit with 2" 600 lb. flanged top and bottom equalizing connections (F-1).



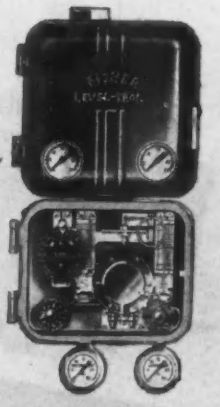
TYPE 2500—proportional pilot for general liquid level control applications.



TYPE 2500T — Level-Trol pilot used as pneumatic level transmitter.



TYPE 2500C—pilot with level indicator. Indicator available on all style Level-Trol pilots.



TYPE 2500 — 2516 dual Level-Trol pilot consisting of Type 2500 for remote level-indication or recording and Type 2516 controller with proportional and reset response.

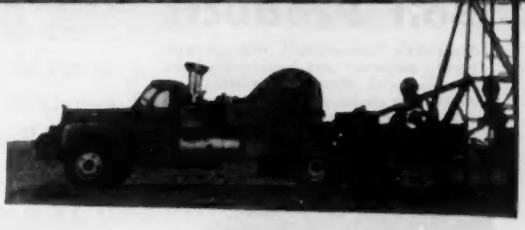
The wide variety of pilots available for mounting on the Level-Trol gives further evidence of the Level-Trol's ability to handle practically any liquid level, interface level, or specific gravity control or indication problem.

FISHER GOVERNOR COMPANY
MARSHALLTOWN, IOWA • WOODSTOCK, ONTARIO

WORLD LEADER IN RESEARCH FOR BETTER PRESSURE AND LIQUID LEVEL CONTROL

FISHER Since 1880

New "all-in-one" well-servicing unit makes headlines in the oil field



From field operating reports comes news of the most advanced design in well-servicing units.

Phillips Petroleum has put together a rig that has large capacity, mobility, and ease of operation combined in a single compact unit. A 66-foot tubular steel derrick of 100,000 pounds capacity, a hydraulic pump capable of developing pressures up to the 2,000 psi necessary to raise and lower the derrick, and a single 37-inch drum winch that handles up to 6,500 feet of 2⅜" tubing or 7,200 feet of sucker rod —all operated by a 3-man crew— have been mounted on a Mack B-62SX chassis for heavy-duty operation in the oil fields.

The Mack B-62SX has power steering, air brakes, and a 10-speed transmission to meet any oil-field condition. For extra stability it is equipped with a safety brake requiring 75 pounds of air before the truck can be moved. The Mack engine operates on liquified petroleum gas with a 9.3-to-1 compression ratio, and has plenty of dependable power to operate the hydraulic pump, thereby saving the weight, space, and cost of an extra powerplant.

Why not find out how Mack can make your field or highway hauling operations more productive and more economical? Let your Mack Branch or Distributor give you the facts about Macks. Mack Trucks, Empire State Building, New York 1, N. Y. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

4079

We "Split Hairs" (and then some) to guard the quality of your Sheffield Bolts

SHEFFIELD
ARMCO

Bolt Products

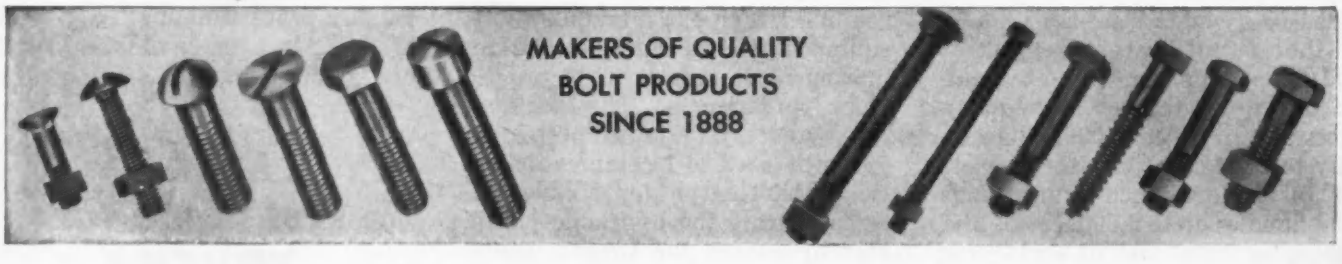
Sheffield's "serv-a-bolt" package with handy dispenser end keeps your bolts in order with filing-cabinet efficiency. Makes for easier handling all around — in the workshop, in the supply room, on the truck, on the job!

The diameter of a human hair is 27/10,000ths of an inch. The super micrometer used to check tools and gauges used in Sheffield bolt manufacture measures accuracy to 1/10,000th of an inch.

That's just one phase of Sheffield quality control. Just one reason why Sheffield bolts give you delicate precision with brute strength. Through every step of Sheffield steelmaking and bolt manufacture, we guard quality constantly with critical electronic, mechanical and chemical controls and tests. Result: bolts that install easier; hold stronger, longer.

Whether you're using bolts on "do-it-yourself" projects, or drilling rig or building construction, you'll get the finest in fastening with Sheffield bolts. Be sure with Sheffield.

SHEFFIELD STEEL
DIVISION
ARMCO STEEL CORPORATION
SHEFFIELD PLANTS: HOUSTON • KANSAS CITY • TULSA



NEVER MISS A "SHOW" OR "DRILL THRU"

WITH

"Spectrolog"

The completely new method of logging for oil and gas shows with new Spectroscopic* equipment, combined with new techniques and seasoned interpretative experience to provide quantitative data never before possible... plus new assurances of accuracy and dependability.

Call or write for full information, technical data, and dates of availabilities... no obligation.

*Patents Pending on Equipment, Operational and Interpretative Procedures.

Petroleum Service Main Laboratory and Research Center, San Antonio, Texas

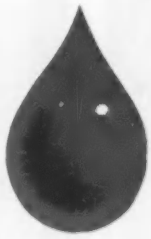
PS RC

Petroleum Service

AND RESEARCH CORPORATION

ALAMO NATIONAL BUILDING

SAN ANTONIO, TEXAS



BEHIND MILLIONS OF BARRELS OF PRODUCTION

Financing by the Republic

The nation's oil reserves are millions of barrels richer because of production loans made by the Republic. With a record of service to oil men equaled by few other banks in the nation, Republic's Oil Department is constantly seeking new opportunities to serve the petroleum industry.

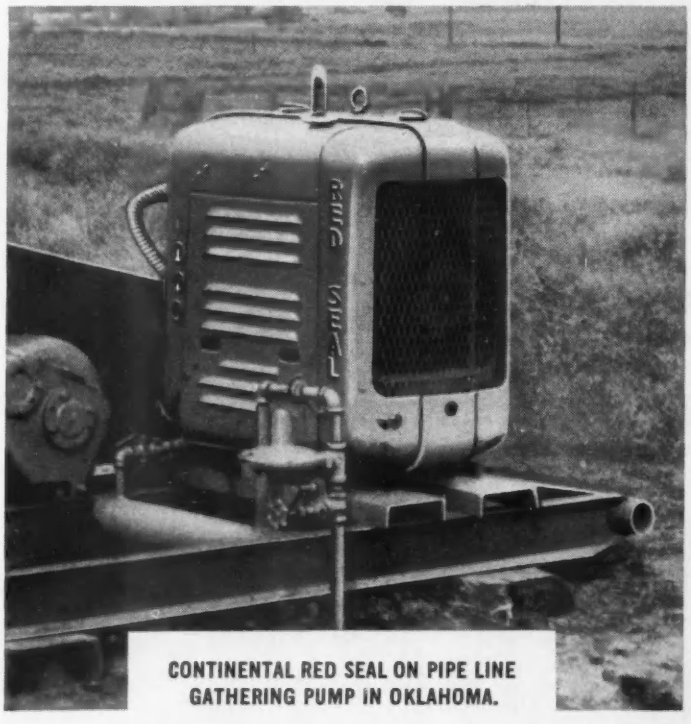
WHAT CAN *WE* DO FOR *YOU?*

REPUBLIC National BANK of Dallas

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

CAPITAL AND SURPLUS $70,000,000 • LARGEST IN THE SOUTH

YEAR-IN YEAR-OUT DEPENDABILITY



CONTINENTAL RED SEAL ON PIPE LINE GATHERING PUMP IN OKLAHOMA.

CONTINENTAL RED SEAL ON KOBE HYDRAULIC PUMPING UNIT IN TEXAS.

• • •

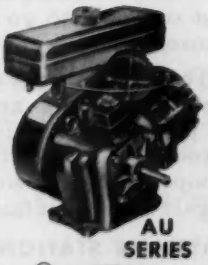
CONTINENTAL RED SEAL POWER

One reason why you see so many of today's Red Seal engines in the oil fields is the fine performance record of those already on the job. Red Seals are engineered for reliability, economy and long life. They span a horsepower range from 10 to nearly 300. They're built for operation on all standard fuels. And they're backed by service and genuine Red Seal parts from coast to coast. Ask your oil field supply store, or write for information.

• • •

A COMPLETE LINE OF 4-CYCLE AIR-COOLED ENGINES FOR HEAVY-DUTY APPLICATIONS

Continental also builds small air-cooled engines, 2 to 3 hp., especially suitable for compressors, pumps, and other jobs where long-continued use with minimum attention is required. Automatic ignition cutoff stops engine when crankcase oil falls below safe operating level. Now available with built-in generator for charging battery and operating lights. For information, write Air-Cooled Industrial Engine Division, 12800 Kercheval Ave., Detroit 15, Mich.



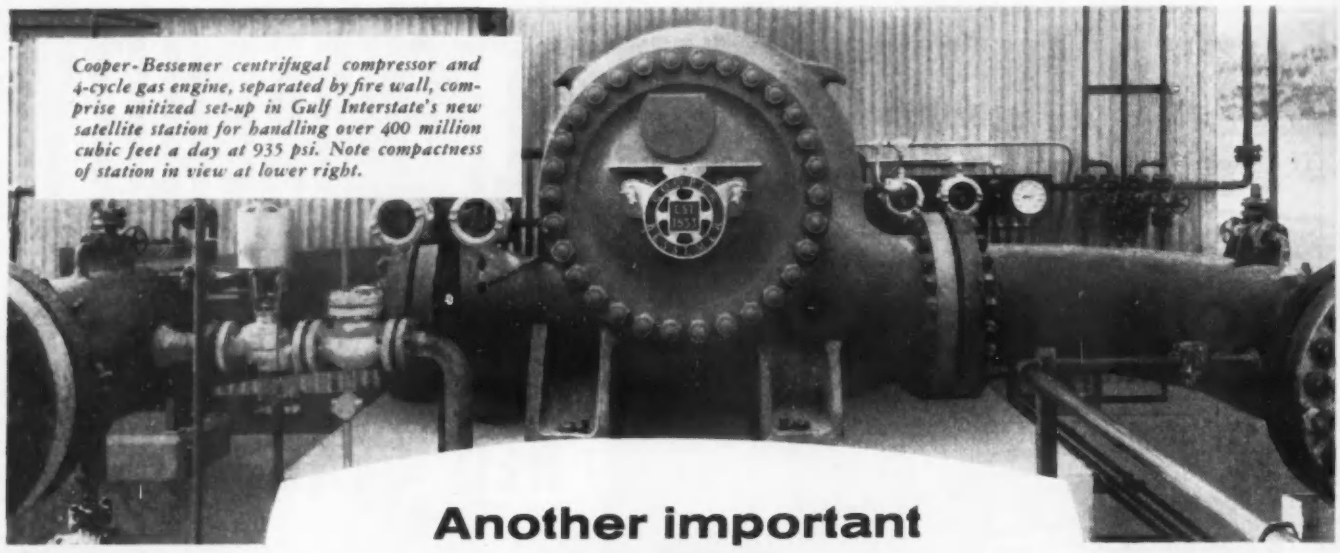
AU SERIES

Continental Motors Corporation

MUSKEGON • MICHIGAN

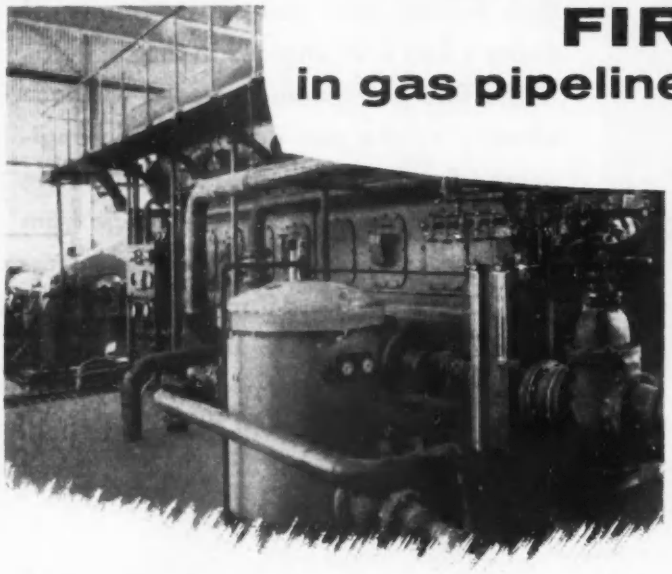
CONTINENTAL MOTORS · Powerful as the Nation · AMERICA'S STANDARD

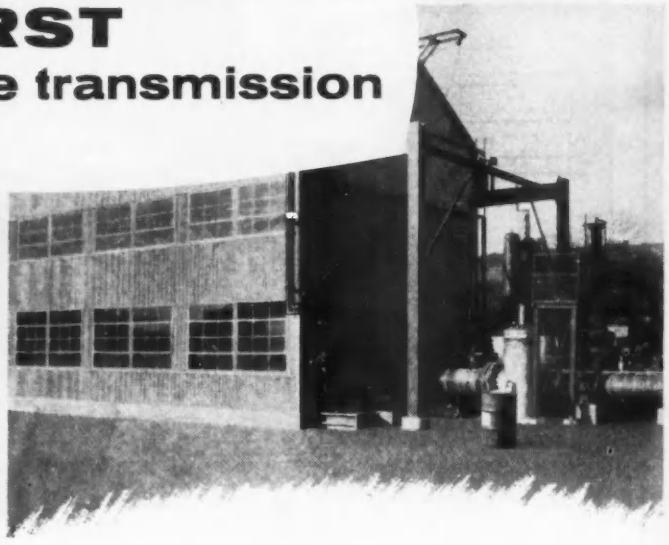
6 EAST 45TH STREET, NEW YORK 17, NEW YORK • 6218 CEDAR SPRINGS ROAD, DALLAS 9, TEXAS • 3817 SOUTH SANTA FE AVENUE, LOS ANGELES 58, CALIFORNIA • 1252 OAKLEIGH DRIVE, EAST POINT (ATLANTA) GEORGIA



Cooper-Bessemer centrifugal compressor and 4-cycle gas engine, separated by fire wall, comprise unitized set-up in Gulf Interstate's new satellite station for handling over 400 million cubic feet a day at 935 psi. Note compactness of station in view at lower right.

Another important FIRST in gas pipeline transmission





Cooper-Bessemer ENGINE-DRIVEN *centrifugal* COMPRESSORS

● A new chapter in the progress of gas transmission has been opened at Gulf Interstate Gas Company's new compressor station near Stanton, Kentucky. Here, a Cooper-Bessemer engine-driven centrifugal compressor is the first such unit to go into regular service on a main gas transmission line.

This precedent is a tribute to Gulf Interstate management for alertness and decisive action in the application of promising new ideas . . . here successfully applied through the close cooperation of Gulf Interstate and Cooper-Bessemer engineering. These are a few of the highly significant features:

SATELLITE STATION . . . for remotely controlled automatic operation—*another* "first" for Cooper-Bessemer engine-driven centrifugals.

IDEAL FLEXIBILITY . . . combines continuous heavy-duty performance with ability to meet peak demands. Greatly increases flexibility of line-to-market gas transmission.

EXTREME SIMPLICITY . . . requiring no separately operating auxiliaries, and unequalled in simplicity of control by most alternate methods.

UNMATCHED ECONOMY . . . unsurpassed in fuel economy by any other type of prime mover today. Secondly, instead of 2 to 5 large conventional compressors, this one unit meets entire requirements.

Cooper-Bessemer engine-driven centrifugals offer identical or similar gains in various types of service. Additional installations are already under way. Why not discuss *your* plans with the nearest Cooper-Bessemer office?

Mount Vernon, Ohio

COOPER-BESSEMER

Grove City, Pa.

Cooper-Bessemer International Corporation

Cooper-Bessemer of Canada, Ltd.

COMPRESSORS, RECIPROCATING AND CENTRIFUGAL • DIESELS • GAS ENGINES • GAS-DIESELS

Pumping their way to Leadership

ALTEN PUMPING UNITS

Thousands of ALTEN Units—operating for years with low, low cost records —*Are Pumping Their Way to Leadership*. Put them to work for you!

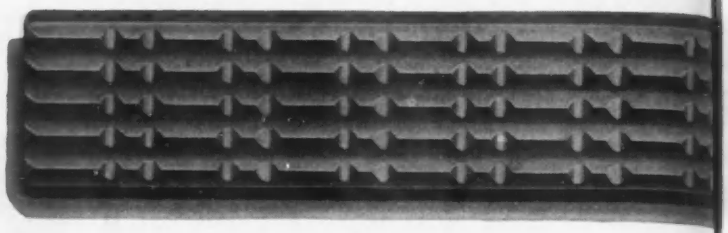
Available in all sizes: small beam balanced, beam and crank balanced, or medium and large types with the ALTEN screw-type adjustable counter balance. You can be sure of peak performance with every model in each series.

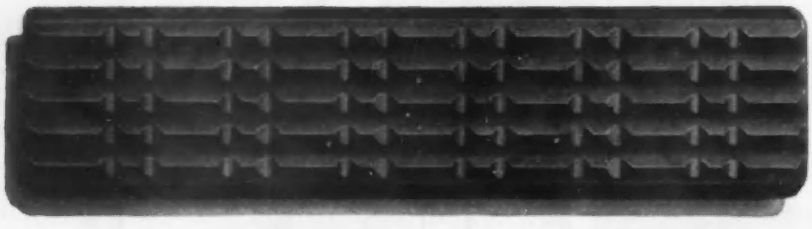
Ask your independent supply store or write ALTEN for latest catalogue and engineering information.

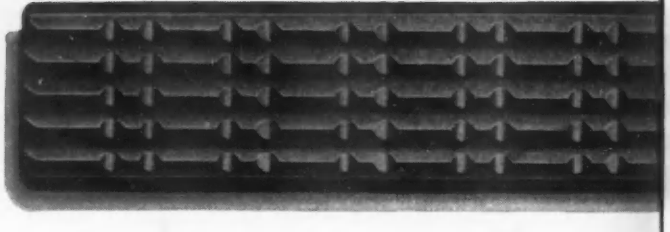
✓ **A FULL LINE OF 47 MODELS AND TYPES**

✓ **WORLDWIDE DISTRIBUTION THROUGH SUPPLY STORES**

-ALTEN-
Foundry & Machine Works, Inc.
LANCASTER, OHIO



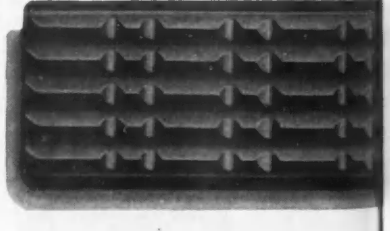




Quality **TONG DIES**

. . . are not hard to identify, and they are easy to find at your supply store. Just be sure you get the black and yellow box containing these yellow Tiger Tooth Tong Dies. The tiger head and WEB WILSON are stamped on the back of each die.

It's easy to prove their QUALITY, too. Install them in *any* rotary tongs and discover for yourself that they DON'T SLIP—they LAST A LOT LONGER, and cost FAR LESS in service.



WEB WILSON
OIL TOOLS, INC.

DALLAS • LOS ANGELES • NEW YORK

Wells formerly junked or sidetracked now cleaned by K & G Drill Pipe Junk Shot and Magnetic Fishing Tools

Somewhere, sometime, every drilling day, someone calls for K & G Magnetic Fishing Tools . . . because oil men know they can complete their fishing job with a minimum of downtime and fishing expense.

WITH rig time, man hours and money tied up by junk in the hole, you want the right tools to get the job done, FAST.

The K & G DRILL PIPE JUNK SHOT cleans up wells formerly abandoned or sidetracked due to non-recoverable lost junk. Run on drill pipe, the powerful K & G Junk Shot is circulated down until it actually contacts the fish, so that maximum explosive force is directed onto the junk . . . easily breaking up large rock bits, slips and other hard-to-recover metallic fish. Easily portable, completely safe, the K & G Junk Shot efficiently minimizes the meanest fishing job.

The K & G MAGNETIC FISHING TOOL magnetically retrieves chipped teeth, lost cones, bearings, tools and fish broken up by the Junk Shot . . . saving valuable hours of fishing time. Superior efficiency proved by thousands of successful runs on tubing, drill pipe or wire line, the K & G Magnetic Fishing Tools have greater lifting power in the permanent magnet . . . circulation ports keep the magnet and bottom shoe clean . . . the rugged steel case withstands severe abuse. Available in complete range of sizes from 1¾" through 11¾", for every size fishing job.

K & G ADJUSTABLE DIAMOND CORE BARREL MAGNETS protect costly core heads, speed coring. Available in popular sizes to run inside the inner barrel of various makes, types and sizes of core barrels, K & G Core Barrel Magnets travel up the inner barrel as the core is cut, carrying all junk recovered from bottom-hole . . . eliminating possible damage to diamond core head.

Be sure to see that it's K & G, designed, developed and manufactured by the pioneers of successful magnetic fishing tools . . . the ONLY company licensed to manufacture under U. S. Patent No. 2,668,077.

K&G

K & G tools available through most fishing tool companies.

OIL TOOL AND SERVICE COMPANY, Inc.

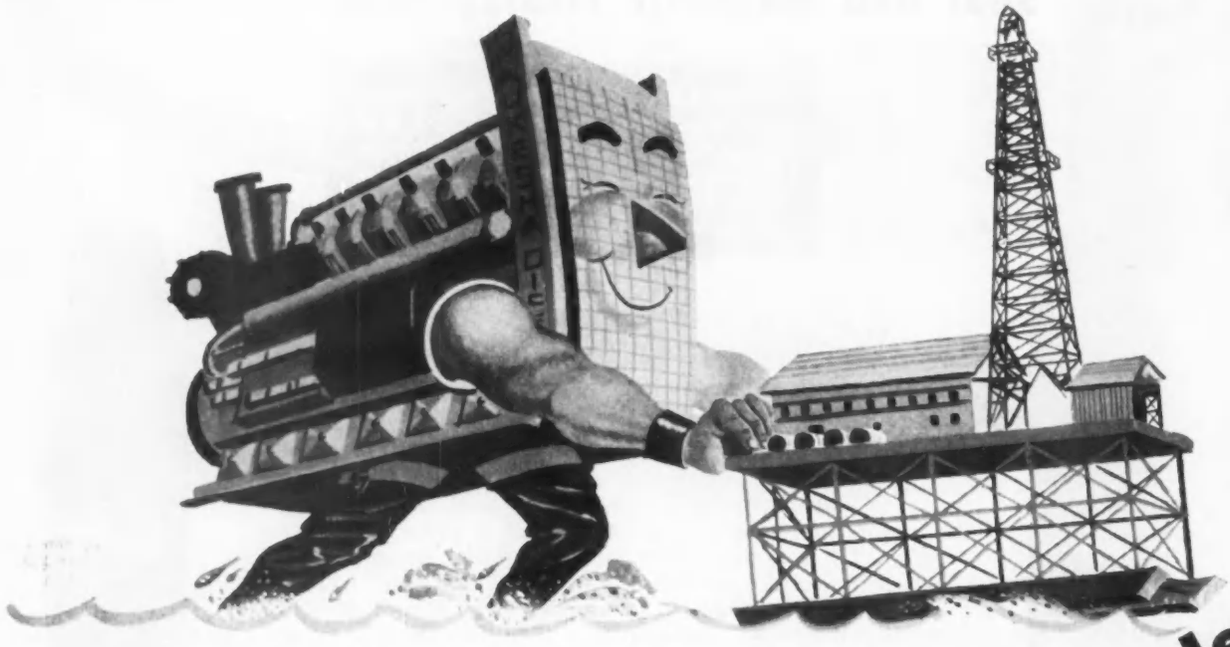
2703 Sackett Street — Houston 6, Texas — JAckson 2-5436

BRANCH OFFICES

CALIFORNIA: Avenal, Phone 228; Bakersfield, Phone FA 5-6734; Los Angeles, Phone LU 7-2171; Long Beach, Phone GA 4-8561; Ventura, Phone MI 3-6767. **ILLINOIS:** Olney, Phone 5226. **KANSAS:** Great Bend, Phone 7819; Liberal, Phone MA 4-3222. **LOUISIANA:** Lake Charles, Phone HE 6-3351; Jennings, Phone 342; New Iberia, Phone EM 4-7436 or EM 4-8171; Houma, Phone 7721; Harvey, Phone FI 1-1647. **NEW MEXICO:** Farmington, Phone DA 5-5162; Hobbs, Phone EX 3-5546. **OKLAHOMA:** Healdton, Phone 155; Oklahoma City, Phone ME 7-2555. **TEXAS:** Abilene, Phone 2-1202; Andrews, Phone 136 or 137; Bay City, Phone CI 5-4621; Beaumont, Phone 4-4307; Borger, Phone BR 3-5031; Brownfield, Phone 2324; Corpus Christi, Phone TU 4-4191; Edinburg, Phone DU 3-2771; Houston, Phone JA 2-5436; Kilgore, Phone 4141; Odessa, Phone FE 7-2172; San Angelo, Phone 6598; Sherman, Phone 127 or 843; Snyder, Phone 3-3563; Victoria, Phone HI 3-3238; Wichita Falls, Phone 3-1437. **WYOMING:** Casper, Phone 3-5749.

6328

Waukesha



we can supply you a complete

When designing your rigs for offshore operations specify Waukesha Diesels and buy them from Waukesha Sales & Service, Inc.

Waukesha, famous for steady, reliable power in oil fields all over the world, has a complete line of diesel engines that range in power from 1100 hp to 10 hp, especially adaptable for offshore operations.

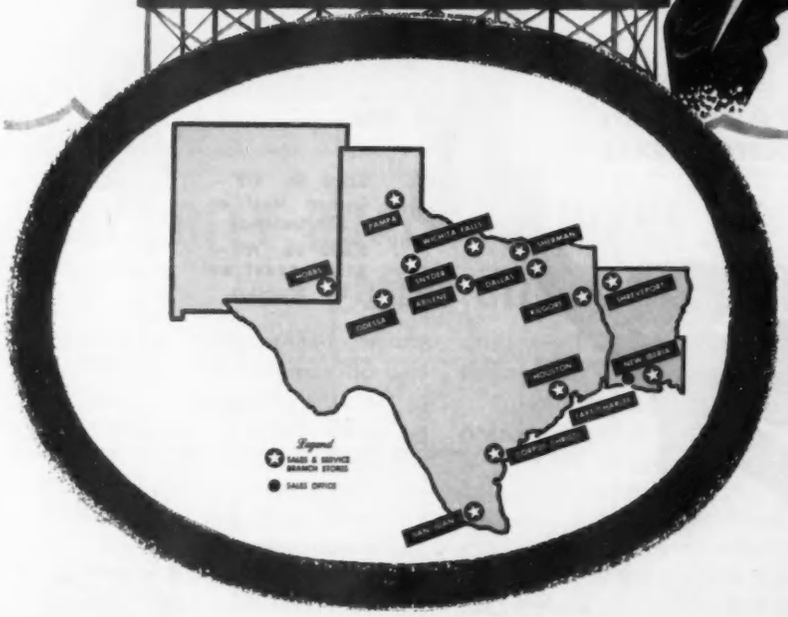
Whether the rig is mechanical or electric there is a Waukesha engine for every specific job—from drawworks to rig lighting, from mud pumps to water pumps.

Waukesha Sales and Service, Inc. sells more oil field engines than any other distributor in the world. When you need power for your offshore rigs, let Waukesha Sales and Service, Inc. help you choose the right engine for the job—any job.

DIESEL ENGINES FROM 10 TO 1100 HORSEPOWER

Sea Power!

diesel-electric package for any rig



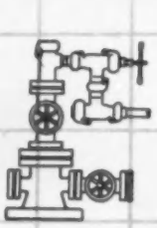
WAUKESHA

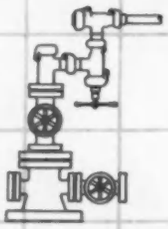
Sales & Service, Inc.

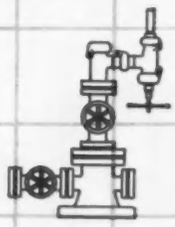
1422 MAURY ST. • HOUSTON, TEXAS

EXCLUSIVE DISTRIBUTORS FOR WAUKESHA PRODUCTS IN TEXAS, NORTH AND WESTERN LOUISIANA, SOUTHERN ARKANSAS AND NEW MEXICO

WORLD'S LARGEST DISTRIBUTOR OF OIL FIELD ENGINES





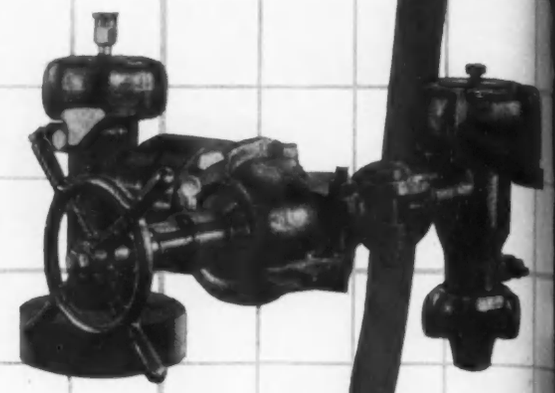


UNIBOLT
flow manifolds

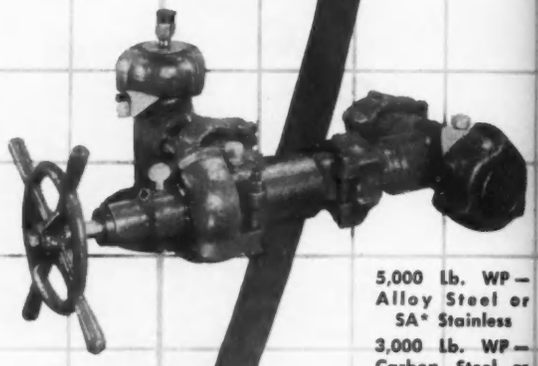
fit your pressures as well as your pocketbook

These are the Christmas tree manifolds that are custom-built to any operator's flow control needs, but at no premium in price. Unlike manifolds of fixed design, UNIBOLT permits complete flexibility in arrangement of its units. Components may have threaded, flanged or UNIBOLT connections. They may be of malleable, regular steel, alloy or SA* stainless, depending upon pressures and service. The chokes may be adjustable or positive with interchangeable flow-rated beans or X-beans. Tee type for single wing or cross type for double wing trees are available. Select exactly what you need for the well. Later on you may salvage the entire manifold as a unit or as individual parts for use elsewhere. By any yardstick, UNIBOLT Flow Manifolds give you far more desirable features . . . at a reasonable cost.

*Special Analysis



10,000 Lb. WP — Alloy Steel or SA* Stainless



5,000 Lb. WP — Alloy Steel or SA* Stainless

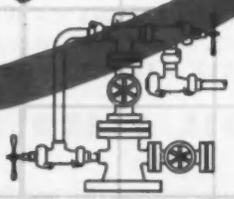
3,000 Lb. WP — Carbon Steel or SA* Stainless

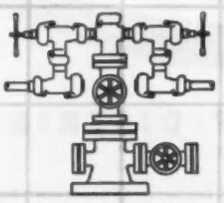
3,000 Lb. WP — Carbon Steel or SA* Stainless

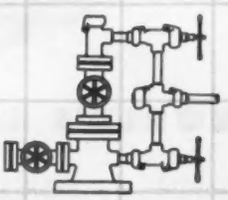
5,000 Lb. WP — Alloy Steel or SA* Stainless

3,000 Lb. WP — Carbon Steel or SA* Stainless

5,000 Lb. WP — Alloy Steel or SA* Stainless







THORNHILL CRAVER CO.
P. O. BOX 1184 HOUSTON, TEXAS

SECURITY QUALITY SHOWS...
after drilling two miles in Arbuckle lime!

Drilling for Frankfort Oil Company near Ardmore, Oklahoma, Riceland Corporation opened 11,616 feet of hole in solid Arbuckle lime — a record depth in this hard rock formation. After comparing performance of the two biggest selling brands of rock bits used exclusively on this location, Riceland Toolpusher Page Arnall said:

"When bits were pulled, Security dulls looked better. Cones and bearings stood up better under this hard drilling — more insurance against fishing jobs."

To look better after coming out of the hole means this: Security bits *were* better before going into the hole. Better engineered . . . better designed . . . better built. Results on this, and hundreds of other locations, prove it! Here, each Security bit averaged four feet of hole more than competitive bits used — 53.7 feet compared with 49.7 feet.

Constantly alert for ways to cut costs, progressive contractors everywhere are switching to Security. Try Security rock bits on *your* next location. Prove to yourself that drilling costs drop when you *get Security in your drilling!*

Security
ENGINEERING DIVISION

Plants: Dallas, Texas • Whittier, California
Export Office: Chanin Bldg., New York, N. Y.

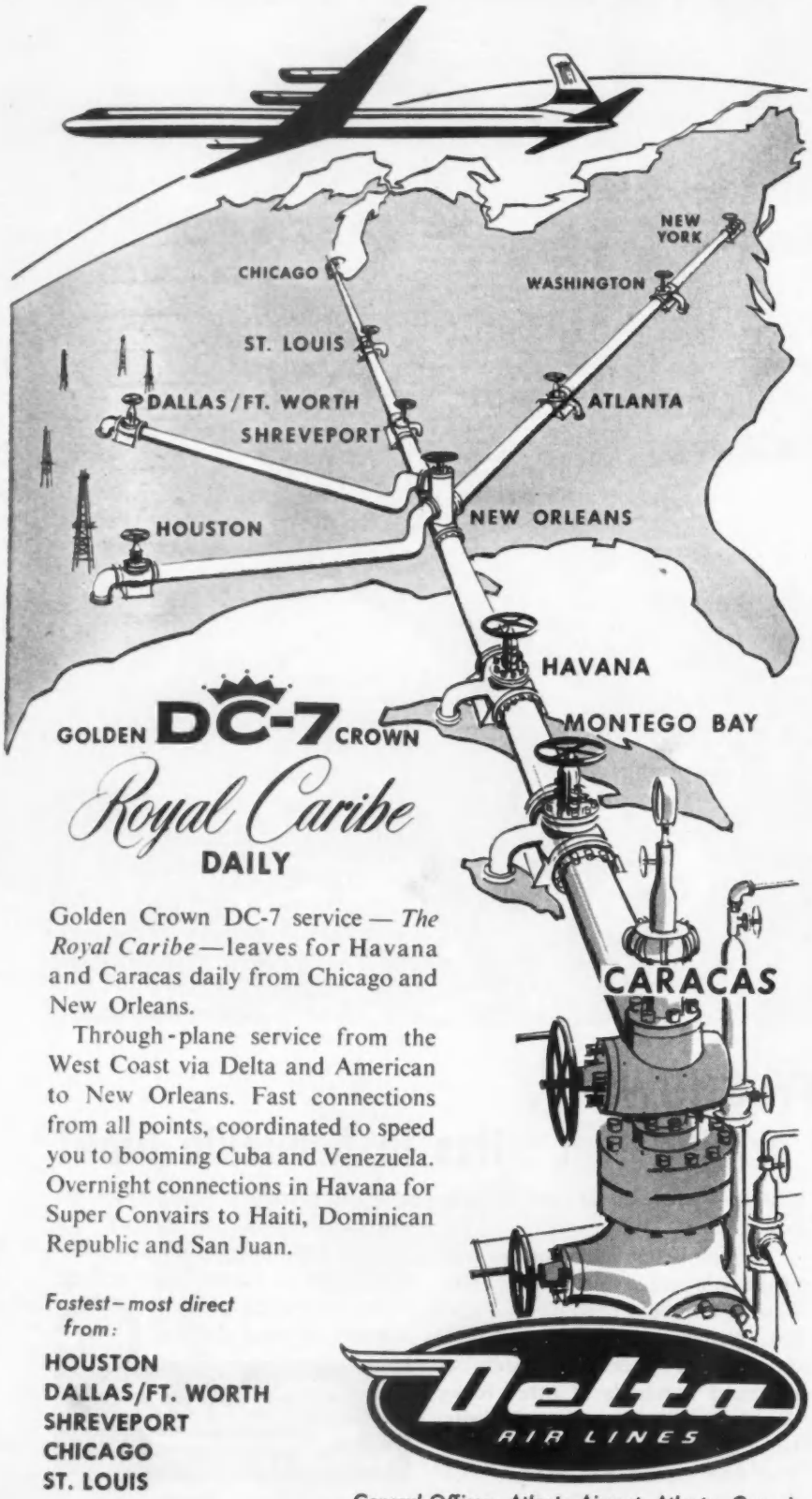
Write for 1956-1957 Catalog.

ROCK BITS • REAMERS • CASING SCRAPERS • RUBBER STABILIZERS

DELTA

the oilman's choice between the U.S. and

HAVANA·CARACAS



GOLDEN **DC-7** CROWN

Royal Caribe

DAILY

Golden Crown DC-7 service — *The Royal Caribe* — leaves for Havana and Caracas daily from Chicago and New Orleans.

Through-plane service from the West Coast via Delta and American to New Orleans. Fast connections from all points, coordinated to speed you to booming Cuba and Venezuela. Overnight connections in Havana for Super Convairs to Haiti, Dominican Republic and San Juan.

Fastest–most direct from:

HOUSTON
DALLAS/FT. WORTH
SHREVEPORT
CHICAGO
ST. LOUIS

Delta AIR LINES

General Offices: Atlanta Airport, Atlanta, Georgia

WHO'S MEETING WHERE

JUNE	
4– 8	National Fire Protection Association, Sixtieth Annual Meeting, Boston.
10–15	API Mid-Year Standardization Conference, Brown Palace and Cosmopolitan Hotel, Denver.
11–12	API Mid-Year Training Committee Conference, Cosmopolitan Hotel, Denver.
13	Pennsylvania Grade Crude Oil Association, 33rd Annual Meeting, Pennhills Club, Bradford, Penn.
20–23	American Association of Petroleum Landmen, Second Annual Convention, Denver.
AUG.	
2– 4	Annual Oil and Gas Institute, University of Colorado, Boulder.
SEPT.	
7– 8	Association of Desk and Derrick Clubs of North America, Fifth Annual Meeting, New Orleans.
20–21	Annual Membership Meeting, Louisiana-Arkansas Division, Mid-Continent Oil and Gas Association, Roosevelt Hotel, New Orleans.
23–26	American Society of Mechanical Engineers, Petroleum Mechanical Engineering Conference, Statler-Hilton Hotel, Dallas, Texas.
26–28	Rocky Mountain Association of Geologists, Fall Field Trip, Southeastern Colorado, Denver.
OCT.	
2– 3	Texas Mid-Continent Oil & Gas Association, 37th Annual Meeting, Rice Hotel, Houston, Texas.
7– 9	American Association of Oil Well Drilling Contractors, 16th Annual Meeting, Texas Hotel, Fort Worth, Texas.
14–17	AIME, Petroleum Branch Fall Meeting, Biltmore Hotel, Los Angeles.
18–21	Permian Basin Oil Show, Ector County Coliseum and Fair Park area, Odessa, Texas.
22–24	Rocky Mountain Oil & Gas Association, Annual Convention, Cosmopolitan Hotel, Denver.
29–Nov. 1	Society of Exploration Geophysicists, National Convention, New Orleans.
NOV.	
8– 9	American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Economic Paleontologists and Mineralogists, Pacific Section, Ambassador Hotel, Los Angeles.
12–15	API, 36th Annual Meeting, Conrad Hilton and Palmer House Hotels, Chicago.
19–20	AIME, North Texas Section, Symposium on Secondary Recovery, Wichita Falls, Texas.
25–30	American Society of Mechanical Engineers, Statler Hotel, New York.
1957	
APRIL 6–11	Petroleum Equipment Suppliers Association, Palm Springs, Calif.

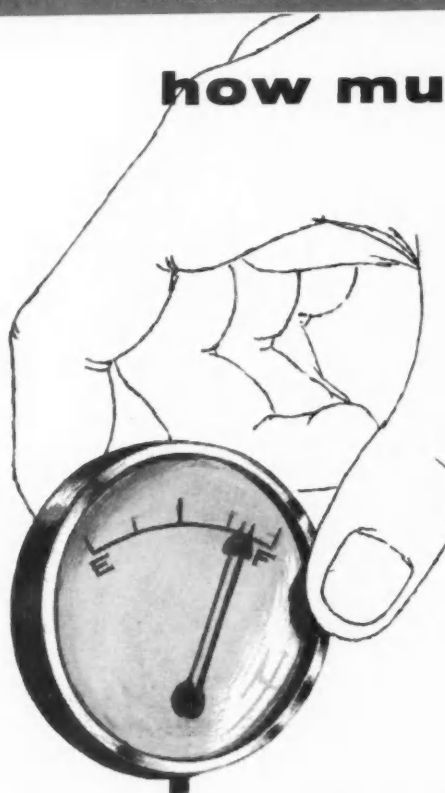
Nomads' Chapter monthly meeting: Los Angeles, second Wednesday, Jonathan Club, Wallace A. Sawdon, Secretary. Houston, second Monday, Ye Old College Inn, Harry E. Estes, Secretary. Dallas-Fort Worth, first Monday, Greater Dallas Club, Hank Davis, Secretary. Tulsa, Hotel Tulsa, Gilbert Swift, Secretary, New York, first Monday, Hotel Biltmore, Jesse E. Hickman, Secretary.

Current Outlook Section

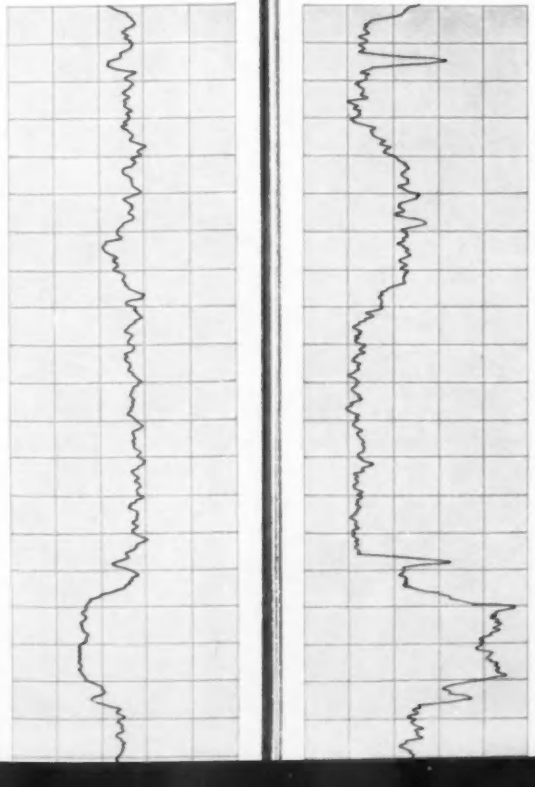
WORLD OIL

L. J. LOGAN, SECTION EDITOR

how much is in that pay zone?



"Q.I." can often add the "fuel gauge"



"Q.I." stands for *Lane-Wells Quantitative Interpretation of Radioactivity Well Logs* – the service which adds for you the all-important information "How Much." For over three years now, operators in Texas, Kansas, Oklahoma and other states have found Q.I.'s estimates of reservoir potential sufficiently accurate for all commercial purposes. New and improved techniques, together with the steadily increasing amount of down-hole data, are rapidly extending Quantitative Interpretation to more and more fields whose formation responses permit reliable evaluation. Your Lane-Wells man can tell you all about this important service—check with him now.

Tomorrow's Tools—Today!®

LANE-WELLS COMPANY®

Radioactivity Well Logging

General Offices, Export Office, Plant
5610 So. Soto St., Los Angeles 58

LOS ANGELES • HOUSTON • OKLAHOMA CITY
LANE-WELLS CANADIAN CO. IN CANADA
PETRO-TECH SERVICE CO. IN VENEZUELA

LR-84-A

CREATIVE BANKING

and the stopped pumps

Creative banking represents more than an interest in your problem. It begins with a detailed knowledge of current conditions, such as lower allowables, stopped pumps. And from this knowledge of the oilman's problems, the ground work to help is laid.

Creative banking works for you. Creative banking means financing flexible enough to help you when help is needed; flexible enough to meet changing conditions as they arise. It means no hard and fast rules to hamper sound financial planning and assistance. Creative banking at The National Bank of Commerce gives you the financial help you need rather than imposing a financial burden.

The experience and resources of The National Bank of Commerce of Houston are now being used in Wyoming, Colorado, New Mexico, Texas, Louisiana, and Mississippi.

E. O. Buck, *Vice President, Oil Loan Department.*

THE NATIONAL BANK OF

COMMERCE

OF HOUSTON *Gulf Building — 712 Main Street, Houston, Texas*

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

WATCH FOR THIS SIGN OF A SPECIAL BUY

Recently, one of the National Supply Store managers literally "reached the end of his rope." So he gathered all the rope end remnants in stock, attached some National "money saving special" tags, and offered them at a big discount. In a matter of hours, the counter was cleaned off.

You won't often see these money saving special tags in any of our 126 stores. One reason, of course, is that merchandise moves rapidly. But the main reason is wrapped up in our store operation policy that is, in effect, a constant bargain for every customer.

Each National Store has a complete line of equipment and operating supplies that's tailored to the needs of the area it serves. A store's stock is never static, but constantly changed to bring you the newest developments in appropriate products.

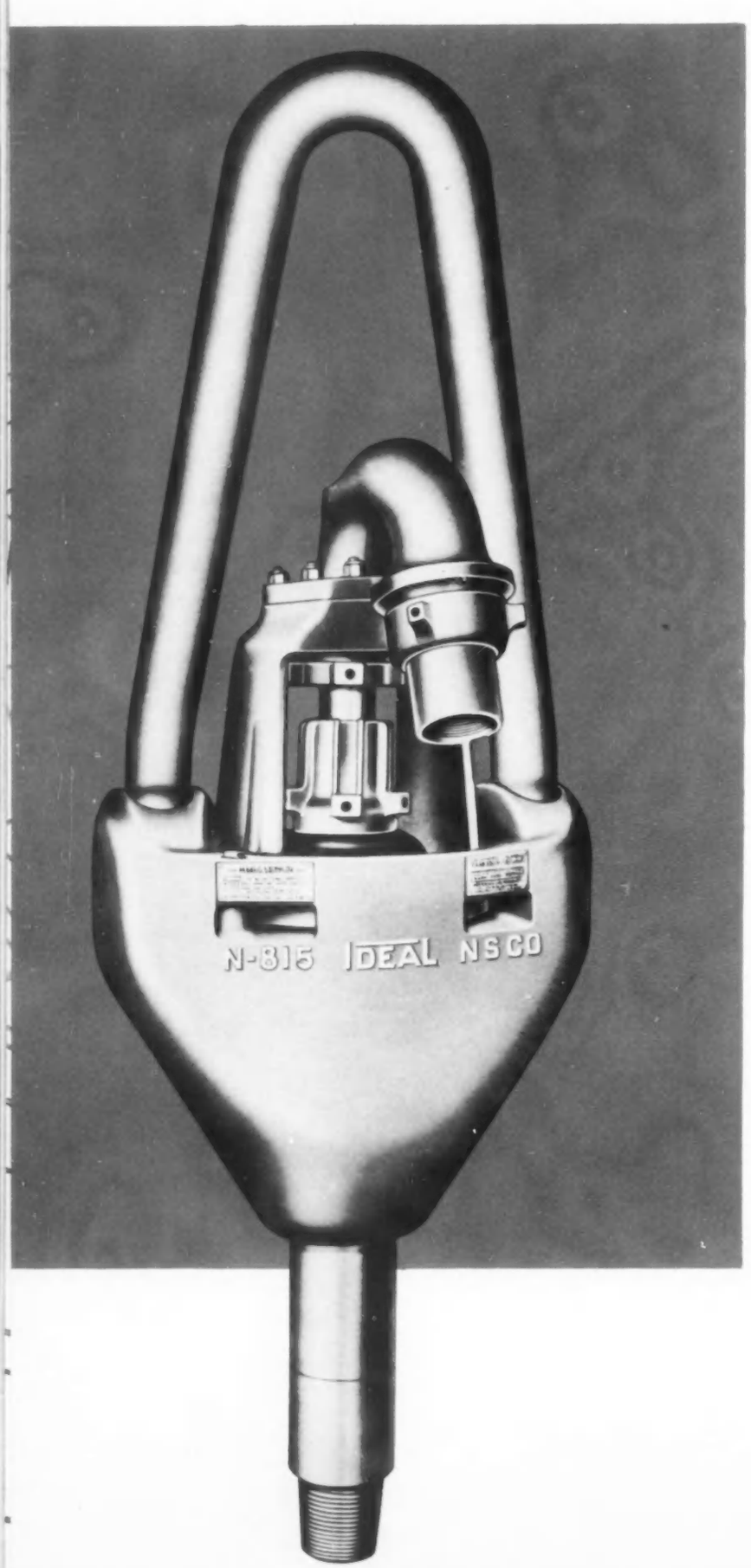
Moreover, we insist on top quality products—from the major equipment in our own "National Blue" products family to the smallest accessory item you can name. We constantly try to anticipate your operating needs and give you the best possible benefits in prices and service.

Such a policy makes *everything* in a National Store a good buy—and thus we reserve the tags only for special situations and products like the rope ends. Actually, we could put bargain tags on all items—so convinced are we of their lasting service value to you.

But you, the customer, are the best and final judge of this. Your use of, and consistently high regard for, National Supply products and services has made us the world's largest manufacturer and distributor of oilfield machinery and equipment.

THE
NATIONAL SUPPLY
COMPANY

6 reasons why you'll reduce drilling c



The simple, compact design of Type N Swivels is typical of the built-in safety of products bearing the Ideal trademark. But this general feature only partially explains their true worth on any rig. Here are six main reasons why these Swivels give you continuous service at low operating and maintenance costs:

1. Reduced weight

Complete redesigning has been employed to bring every model down to minimum weight in relation to individual rated capacity. The use of high quality, high-strength components throughout has reduced both over-all height and weight to greatly facilitate handling.

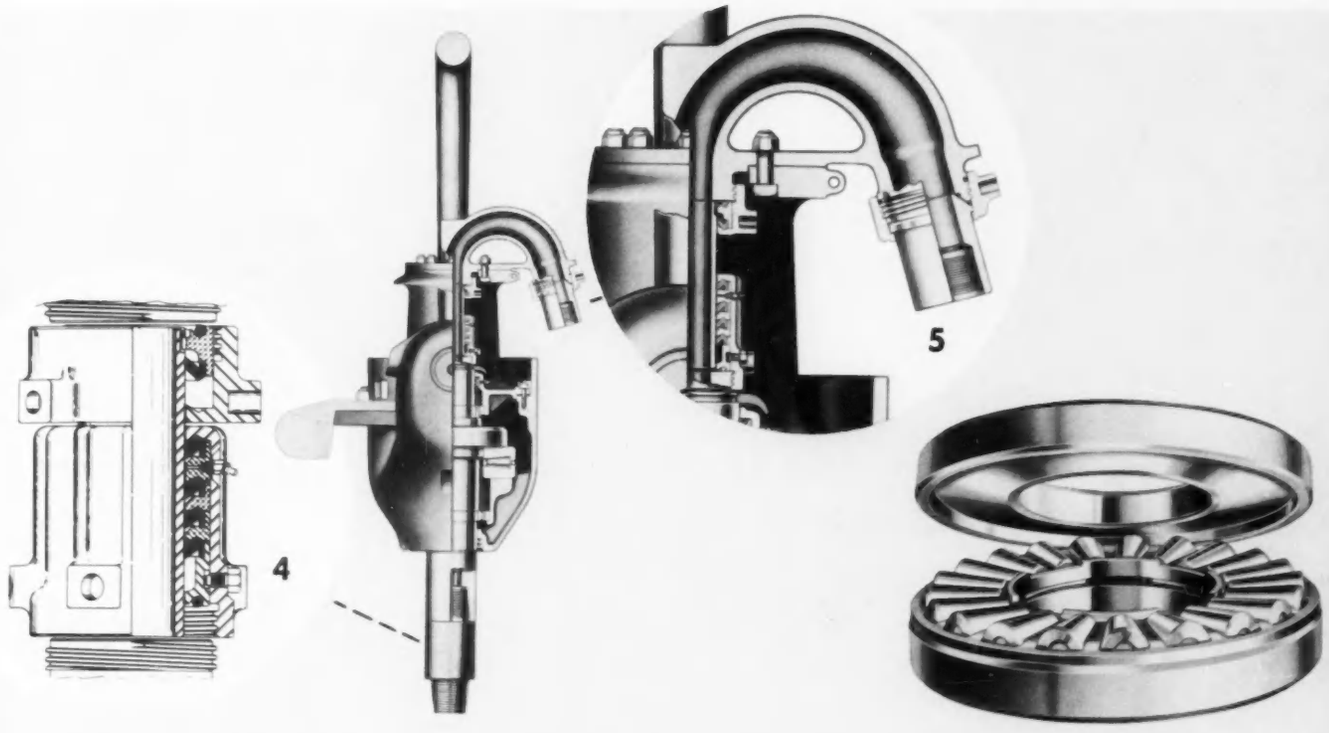
2. Lower center of gravity

Centerline of the bail pins on Type N Swivels has been raised, thereby lowering center of gravity. This means greater stability in handling, makes connection of swivel "sub" to kelly easier and faster.

3. Streamlined exterior

The one-piece steel body is free from any dangerous projections. All bolts, nuts, pins and grease fittings are recessed to assure maximum safety to the derrick crew.

costs with National's Type N Swivels:



4. Fast wash pipe replacement

National's exclusive Uniflex Wash Pipe Box assembly is standard on all Type N Swivels. Its Nationaloy wash pipe is of the free-floating type. The packing assembly has inverted rings and provides an improved method for packing off the mud. The Uniflex assembly also has quick-acting threads to speed replacement, is easily assembled by one man, can be installed without removing the gooseneck or breaking the hose connection.

5. Rapid hose coupling

Also standard on all Type N Swivels is the Quick-Seal Hose Connection that speeds make-up of hose joints. All parts are made of steel, and are plated to minimize corrosion and galling of threads. Besides eliminating one hose connection member and therefore minimizing the chance of mud leakage, the Quick-Seal Connection features larger, quick-acting threads and sealing elements to withstand rugged use.

6. Precision main bearing

This bearing is the perfected result of 40 years of National experience in design, manufacture and field performance. Made of highest quality steel, it is precision-machined throughout, and constructed to withstand the extreme loads and high rotating speeds found in modern drilling. A patented spherical contour on the outer end of the rollers draws lubricant between roller and race plate to minimize friction and wear.

There's a Type N Swivel for every drilling job!

Whatever the drilling job, there's a Type N Swivel to economically suit your needs. Check the chart on the right, and get more information on your choice from a National Supply representative.

Type	Depth Range, Feet	Comparative Dead Load, Tons
N-24	2,000– 4,000	110
N-35	3,000– 5,000	150
N-47	4,000– 7,000	200
N-69	6,000– 9,000	300
N-815	8,000–15,000	400
N-1324	13,000–24,000	500

THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1
NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

next page: National's dependable Blocks

For new drilling speed and safety, use National's Blocks!

If you're losing time and money because of slow or unsafe block operation, National's line of Hook Blocks and Traveling Blocks can solve your problems. Every block is engineered for safety, built for rugged service and thoroughly field-tested. You can choose from a complete line of Hook Blocks and Traveling Blocks that National has developed for every drilling need, and get these outstanding features:

SPECIAL HOOK FEATURES

- Hook body mounted on tapered roller bearings
- Elevator link supports equipped with positive retaining links
- Automatic-latching hook tongue cannot be accidently opened
- Spring-actuated 8-position rotation lock
- Grooved hook body facilitates drill pipe alignment with elevator

TRAVELING BLOCK FEATURES

- Sheaves independently mounted on tapered roller bearings
- Individual lubrication to each sheave bearing
- All parts securely locked for safety
- Streamlined—all nuts, bolts, pins and fittings recessed
- Short, low stressed pins and shafts

Your National representative will be glad to give you more information about National's line of Hook Blocks, Traveling Blocks and companion Crown Blocks. Ask him soon about the units that can put new speed and safety into your drilling program.

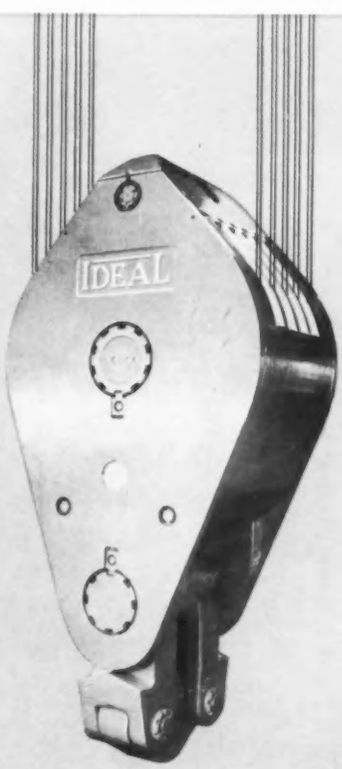
THE
NATIONAL SUPPLY
COMPANY

MAIN OFFICE: Two Gateway Center, Pittsburgh 22, Penna.
DIVISION OFFICES: Denver; Ft. Worth; Houston; Toledo; Tulsa; Torrance
CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta
EXPORT: 600 Fifth Avenue, New York 20, N.Y., U.S.A.; City Wall House, Chiswell Street, London E. C. 1

NATIONAL BLUE OIL FIELD MACHINERY AND EQUIPMENT
SPANG STEEL PIPE AND ELECTRICAL CONDUIT

Type E
HOOK BLOCK

Designed to effect the greatest possible saving in vertical derrick space, this 200-ton rated block is typical of the Type E line. Type E blocks are available in three sizes for 90- to 200-ton loads. A complete line of Type E traveling blocks is also available.

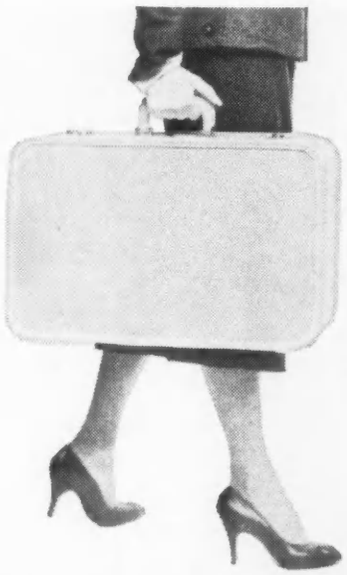


Type F
TRAVELING BLOCK

Typical of National's Type F series blocks, this 450-ton capacity traveling block is designed to remain stable in operation even under no load. Type F blocks are available in two sizes for 300- to 450-ton loads.

Type F
UNIVERSAL HOOK BLOCK

The swivel block "universal" pin joint feature in this heavy-duty, 450-ton rated block distinguishes it from rigidly connected hook and block combinations. Type F Universal Blocks are rated for 300- to 450-ton loads.



Why Oilwomen Everywhere are Saying...

"Have Magic Suitcase ...Will Travel"

Every woman is interested in beauty—clothes—homemaking. But not every woman knows how big a part *oil* plays in a woman's world! That's why the Oil Industry Information Committee sponsors a Women's Program.

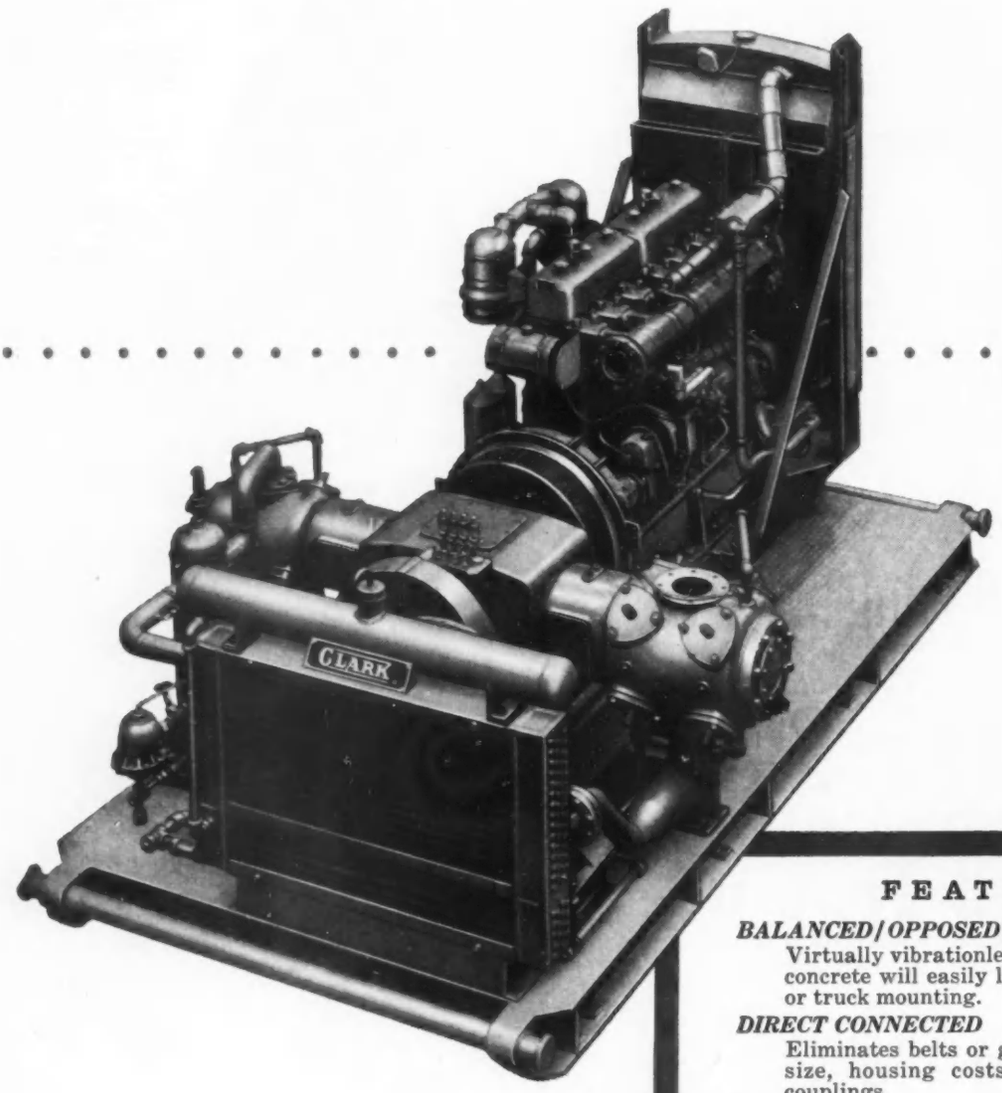
Today, hundreds of oilwomen—industry employees and oilmen's wives—help tell the story of oil in an interesting and dramatic way. The "Magic Suitcase" is one way. It contains products made from petroleum—cosmetics, detergents, oil-based "miracle" fabrics and many other items a woman uses in her daily life. This demonstration—as well as other lectures and displays—shows her how *oil* and *oil* products help make her look more beautiful and make her housework much easier.

The Women's Program is only one of many ways through which your OIIC helps show the public that it is best served by a privately-owned, fully competitive oil industry. If *you* would like to aid in the Women's Program—or another of OIIC's many activities—contact the OIIC in your area today. You'll not only be helping your industry but you'll get a wonderful sense of personal satisfaction from it as well.

For the address of your local OIIC office, write to . . .

AMERICAN PETROLEUM INSTITUTE, 50 W. 50th St., New York 20, N. Y.

NOW... a compact 75-200 bhp



FEATURES

BALANCED/OPPOSED COMPRESSOR DESIGN
Virtually vibrationless . . . a couple of yards of concrete will easily level it. Perfect for barge or truck mounting.

DIRECT CONNECTED
Eliminates belts or gear drives. Reduces skid size, housing costs. Simple rubber block couplings.

ONE PIECE SKID
Simple to install, move or shelter . . . only 7' 3" x 15', rigid heavy "I" beam construction.

TWO STAGE
For maximum efficiency and thru-put.

CONSERVATIVE PISTON SPEED
Lower than on most Clark stationary compressors, assures long cylinder life.

HEAVY DUTY RADIATOR
Straight finned tubes. Easy to inspect or clean, inside or out. Provides intercooling and cylinder jacket cooling.

FACTORY ASSEMBLED AND TESTED
No field assembly. Shipped as a complete unit.

STANDARD ENGINE DESIGN
Five makes of proved engine designs available.

APPLICATIONS
Use it for gas lifting, gas gathering, gas boosting, pipeline testing, recycle plant feeders, other field services.

Always ready . . . always able to handle your drop forge designs

Bethlehem's drop forge shops are ready for you—always!

You can depend upon us for volume production. Even more important, you have the assurance of expert workmanship. Unless you have been through the Bethlehem shops, it is hard to visualize their full extent and the care with which each step in an order is handled.

Bethlehem produces an almost endless variety of designs for the oil, mining, aviation, automotive, electrical, and other industries. This is made possible by strictly first-class facilities, which include a modern die-sinking plant, steam and board drop hammers to 8,000 lb, mechanical presses to 3,000 tons, upsetters to 9 in., and full heat-treating equipment.

We're anxious to do business with you. Why not call us when you are next in the market for closed-die forgings? You'll find our prices and deliveries are fully competitive.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

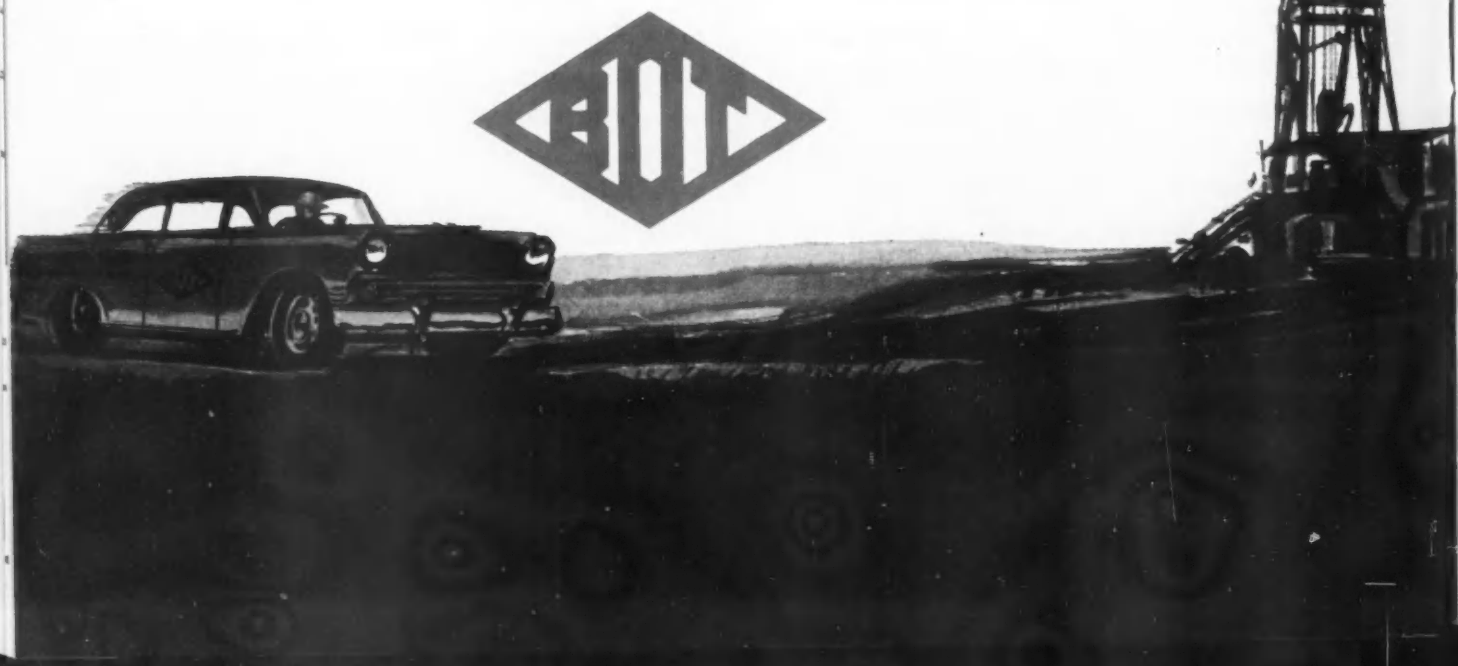
BETHLEHEM STEEL

BETHLEHEM STEEL

No service compares with Brown Oil Tools
Twin Services·Production Tools and Fishing

Good service is something Americans expect and demand today. This is particularly true in the oil country where around-the-clock, efficient service is the standard of the industry. In the highly competitive oil field service industry Brown Oil Tools stands out. Only Brown has the service organization capable of retrieving every tool they put in the hole. The Brown Service Engineer is always at your call to take a personal and professional interest in the job he's going to help you with — and he's backed up by Brown's 25 years experience with production tools and fishing jobs.

BROWN OIL TOOLS, INC.
HOUSTON, TEXAS



looking for Oil in TEXAS?

. . . call GSI Accurate geophysical information is a valuable aid to your geologists . . . by combining the exploration tools of geology and geophysics you can greatly increase your chances of success in every wildcat venture.

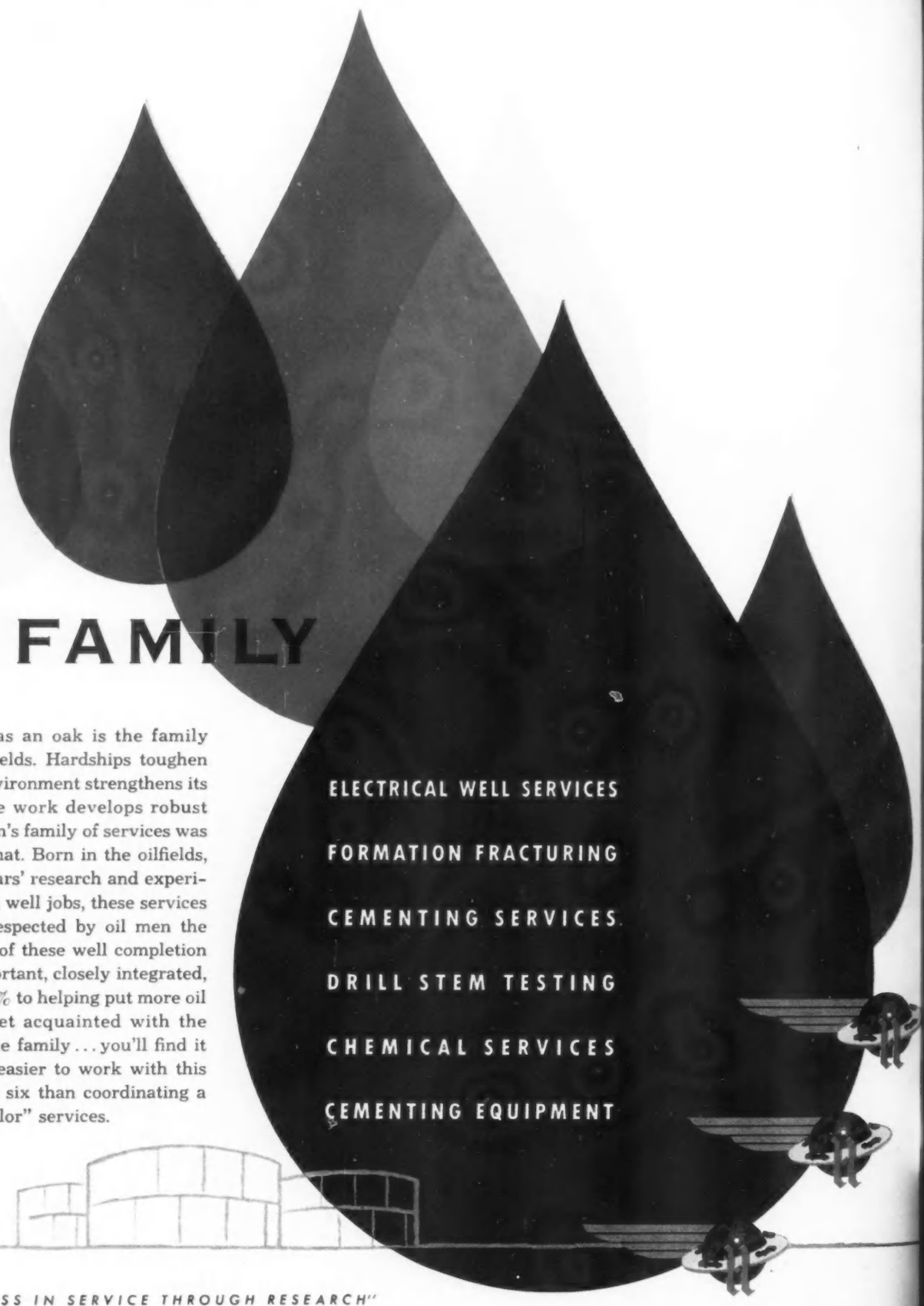
Talk to GSI when you are looking for oil in Texas, or throughout the world. Let your geologists and GSI plan the most efficient method of conducting exploration of your prospect. Your nearest GSI representative can supply a range of instrumentation, personnel and equipment tailored to fit all your survey requirements.

Write for bulletin 56-1, describing GSI's facilities for conducting seismic and gravity-magnetic surveys throughout the world.

OTHER U. S. OFFICES IN . .
HOUSTON • MIDLAND
SHREVEPORT • HOUMA
NEW ORLEANS • DENVER
BILLINGS • CASPER
BAKERSFIELD

GEOPHYSICAL SERVICE INC.
5900 LEMMON AVENUE DALLAS 9, TEXAS

A World of Experience in Finding a World of Oil



OIL FAMILY

Tall and strong as an oak is the family raised in the oilfields. Hardships toughen its moral fiber, environment strengthens its character and the work develops robust health. Halliburton's family of services was brought up like that. Born in the oilfields, schooled by 30 years' research and experienced by 3 million well jobs, these services are known and respected by oil men the world over. Each of these well completion techniques is important, closely integrated, and dedicated 100% to helping put more oil in your tanks. Get acquainted with the Halliburton service family . . . you'll find it much better and easier to work with this one source for all six than coordinating a number of "bachelor" services.

ELECTRICAL WELL SERVICES

FORMATION FRACTURING

CEMENTING SERVICES

DRILL STEM TESTING

CHEMICAL SERVICES

CEMENTING EQUIPMENT

"PROGRESS IN SERVICE THROUGH RESEARCH"

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

THERE'S A *Flying "R"* NEAR YOU

REPUBLIC SUPPLY

SERVING YOU FROM
58 *Stores and Sales Offices*

Announcing a new Republic Supply Store at Morgan City, La.

to serve the in-shore and off-shore drilling operations in that area.

In recent months other new stores were built at Kimball, Nebraska; Medicine Lodge, Kansas and Pawhuska, Oklahoma.

These additions make a total of 46 Republic Supply Stores, with adequate stocks in active fields . . . and 12 sales offices in cities which are headquarters for all divisions of oil country operations.

Republic Supply keeps pace with your needs by establishing new stores near the centers of oil field activity. A combination of experienced personnel, quality products and wide coverage always assures you of satisfactory service.

Republic Supply
COMPANY

OKLAHOMA CITY 1, OKLA.

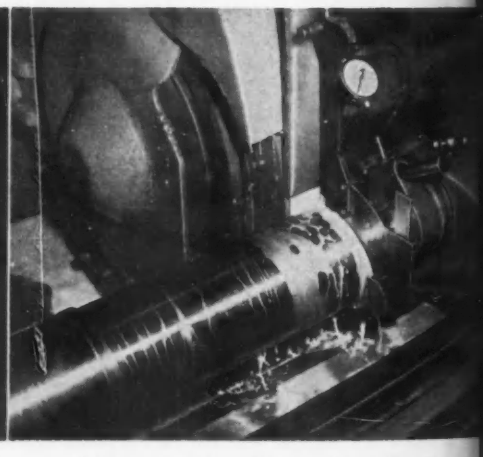
Quality

CARDWELL BACKS US WITH

WE'RE DOING THIS TO GIVE YOU A BETTER

You get...smooth running, proper balance and longer life from your brake flange because of precision machining.

You get . . . longer wearing gears and sprockets because of our modern electronic induction hardening process.



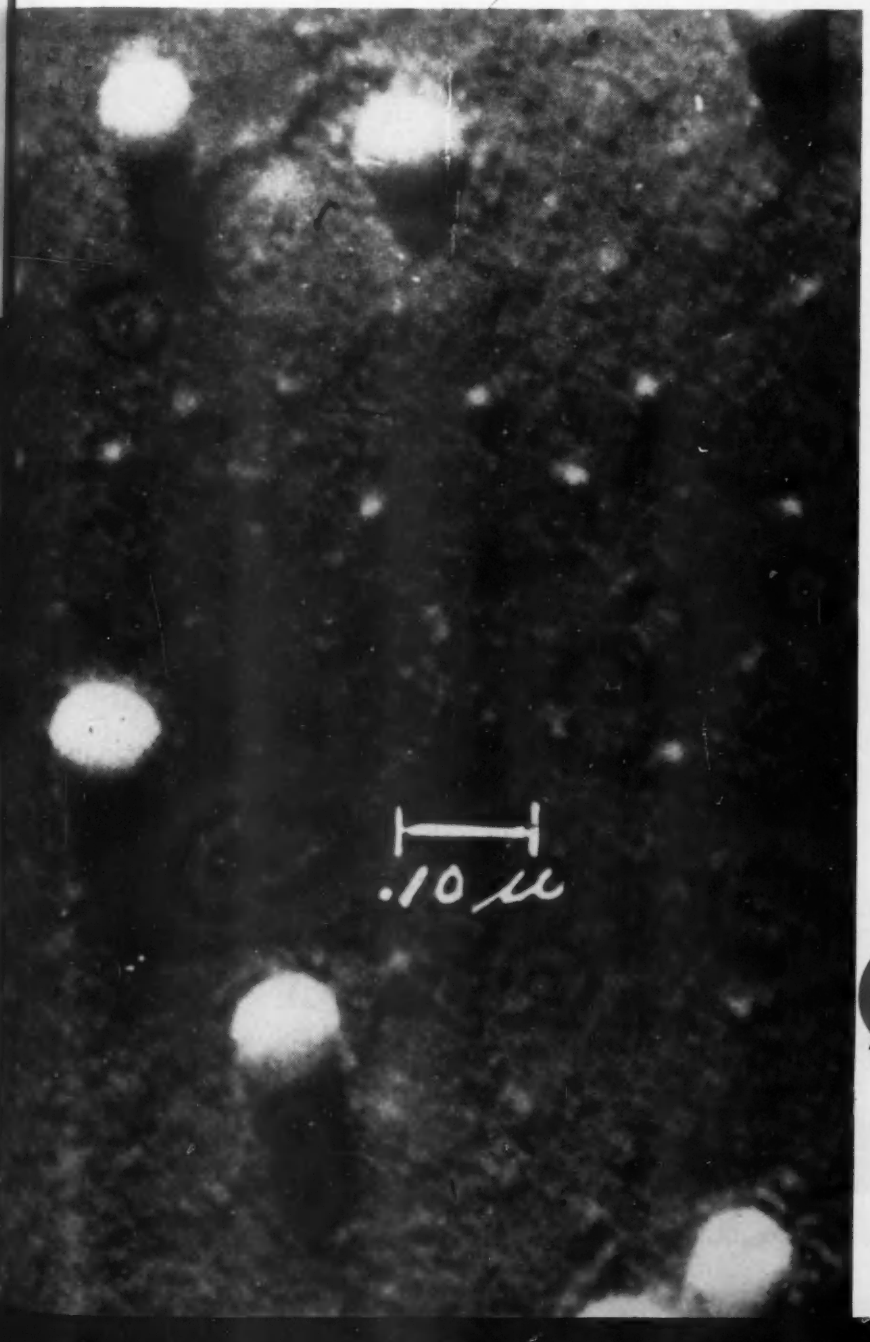
You get . . . proper bearing fit and longer bearing life because of our grinding of bearing seats to .0001 exact tolerance.

CARDWELL

CARDWELL MANUFACTURING COMPANY • Box 2001,

MEASURING THE UNSEEN

Influenza virus magnified 78,570 times by an electron microscope. The unit of measure shown, 0.1 μ, is 1/10,000 millimeter.



Tuboscope research in its field has been as imaginative and rewarding as the electron microscope has been in its field.

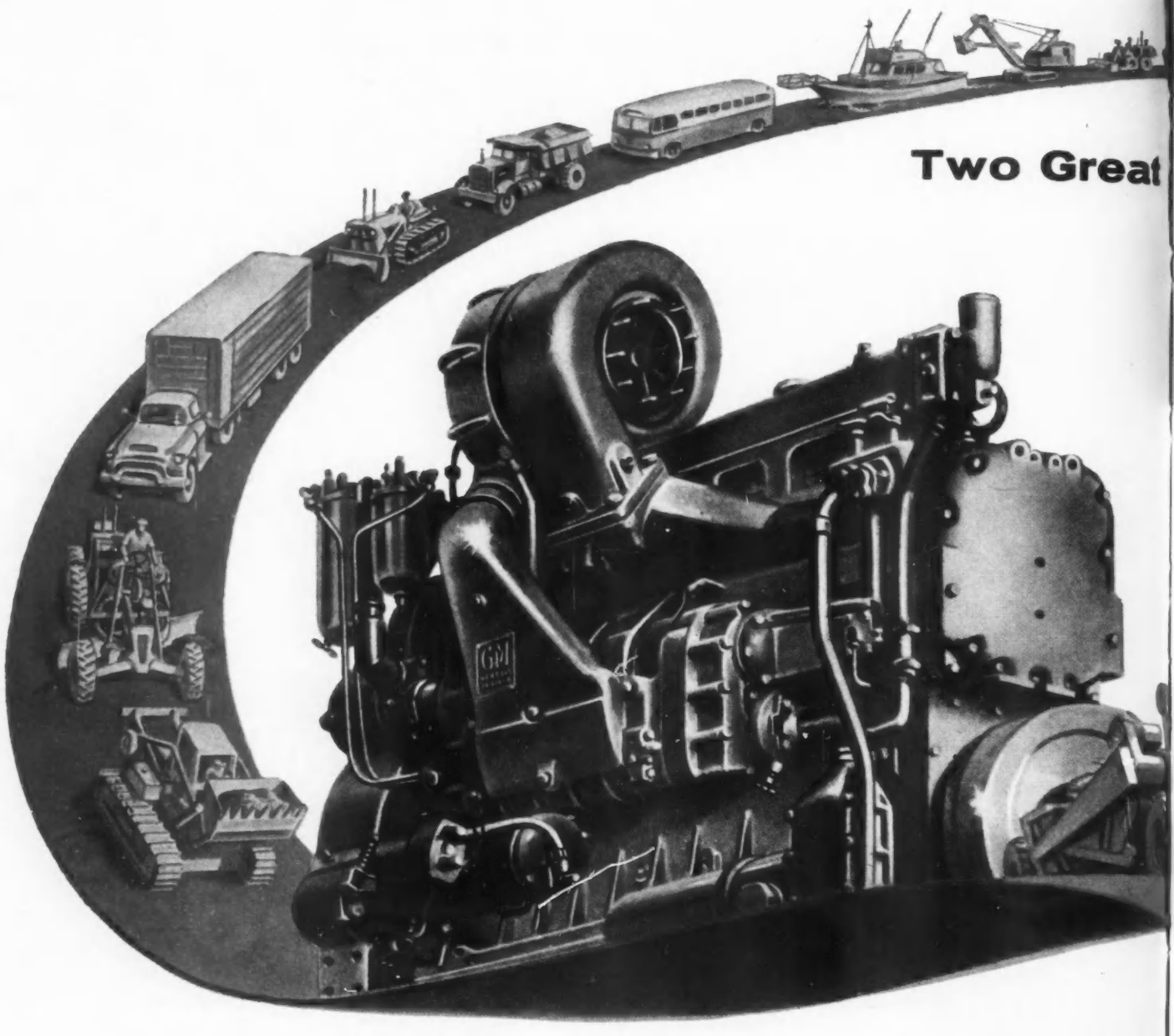
With instruments developed by Tuboscope research, Tuboscope technicians are able to measure the unseen ravages of wear, fatigue, and corrosion in oilfield tubular goods. These instruments, coupled with Tuboscope's years of experience, assure you of the best and the newest in proved methods of non-destructive inspection in the field.

The important elements of bottom hole temperature and pressure can likewise be measured by the Subsurface Engineering Division.

Tuboscope COMPANY

2919 HOLMES RD.

HOUSTON, TEXAS



Increased Power—Decreased Fuel

Here's exciting news for power users—great new 4- and 6-cylinder GM Detroit Diesel engines that represent another long forward step by the leader in the Diesel engine field. With this new, more efficient Detroit Diesel Turbopower you can have up to 17% more power with no increase in fuel consumption—or the same power output with fuel saving up to 15%.

Detroit Diesel engineers have Turbocharged 2-cycle Diesels by combining an exhaust-driven turbine with the engine blower to deliver a larger supply of fresh air to the cylinders. Result: improved combustion, freer engine breathing, quieter and more efficient performance in the higher speed ranges.

Turbopower Diesels are additions to Detroit Diesel's time-proved Series 71 line, world's most widely used Diesel engines. The four-cylinder Turbopower Diesel delivers 171 H.P. at 2300 R.P.M.; the six-cylinder engine produces 280 H.P. at 2300 R.P.M.

To truckers Turbopower means speedier, more economical movement of big payloads.

To boatmen it means faster speed or longer cruising range—more room for cargo.

To contractors and other industrial users it means greater work output from higher-powered engines or improved economy.

For the full story of 2-cycle Turbopower, write us or call your nearest GM Detroit Diesel Distributor or Dealer.

AMERICA'S LARGEST BUILDER OF DIESEL ENGINES

Drilling Section

WORLD OIL

JOHN N. SCHUELKE, SECTION EDITOR

Feet that move at your command

anywhere . . . anytime

trained specialists of the TOTCO service organization will answer your call for assistance in the field. They are just as reliable as the famed TOTCO recorders which give the ultimate in trouble-free service.

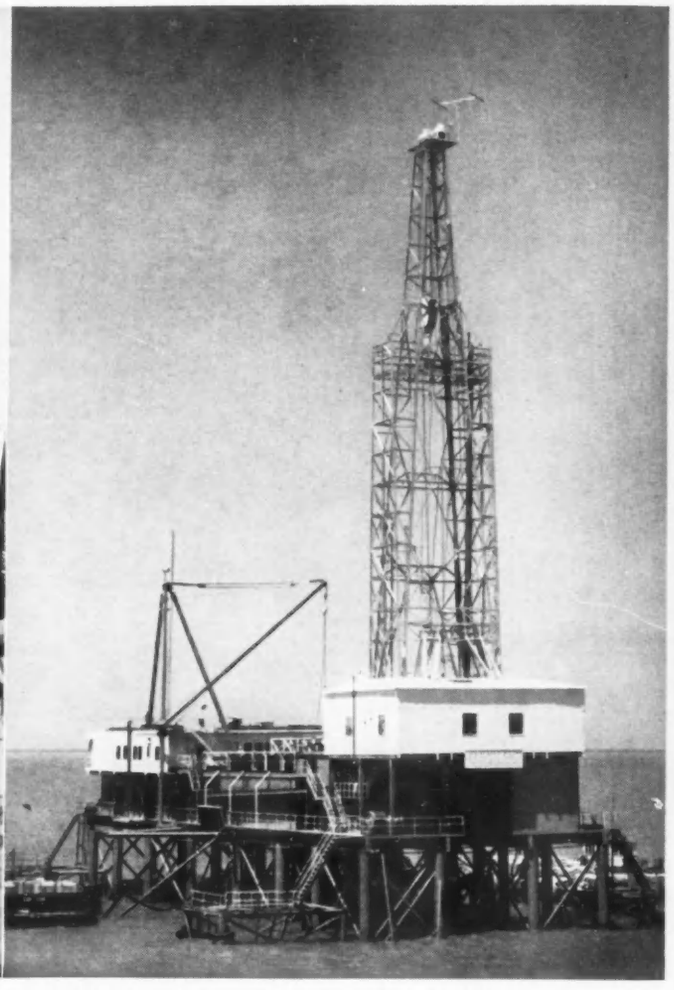
TOTCO

Technical Oil Tool Corp., Ltd. • *1057 North La Brea Avenue, Los Angeles 38, California*

Exclusive Distributors: *California*—The Republic Supply Co. of California; *Domestic*—The Continental Supply Company; *Canada*—Oil Well Supply Company; *Export*—Lucey Export Corp., New York City

YOUNGSTOWN meets the challenge of changing times

YESTERDAY'S requirements seem simple when we look back. With depths under 2,000 feet, demands on derricks and the tubular goods were not so exacting.



IN 1956—With drilling depths well below 15,000 feet—on sea and land alike—drillers must have products designed for today's more difficult conditions.

Like the modern steel rig, today's drill pipe, casing and tubing are engineered for the stresses of offshore drilling

QUALITY YOUNGSTOWN SERVICE

YOUNGSTOWN OIL COUNTRY TUBULAR GOODS

- Casing—Tubing Drill Pipe
- A full line of types, weights and sizes
- Meets all API specifications
- Satisfactory service in every foot

With changing times, Youngstown products have kept pace with the ever advancing requirements of the industry. Today's drill pipe, casing and tubing measure up to the severe demands of offshore and deep well drilling. Top quality when the industry was young, Youngstown will meet your 1956 requirements just as it did yesterday.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

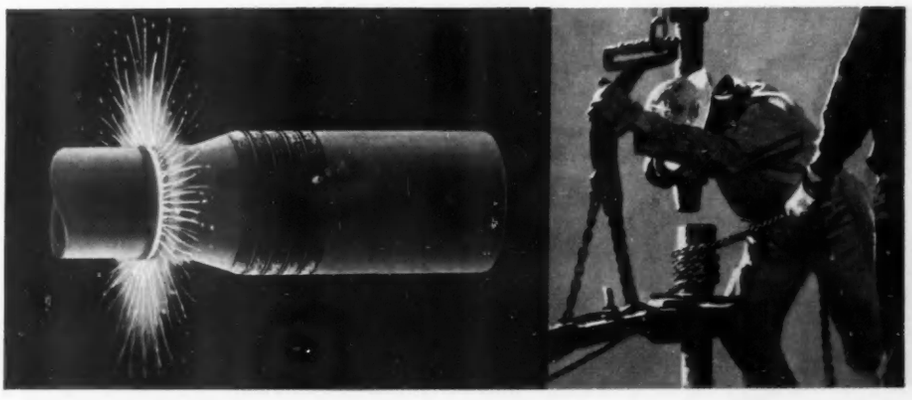
General Offices - Youngstown 1, Ohio

District Sales Offices in Principal Cities

• drilling in remote areas calls for "Flash-Weld"

When your rig is isolated, like the one pictured here, you appreciate the *dependability* and *economy* of a drill stem that has been unitized with "Flash-Weld" tool joints. Out there it is doubly important to avoid the delays and extra cost of changing joints.

For that very reason, operators... in increasing numbers ...are relying on "Flash-Weld" — the joints that last the life of your drill stem — *don't have to be replaced!* HUGHES "Flash-Weld" joints have been proved on more than 35,000,000 feet of drill pipe.



FLASH-WELD

A DEVELOPMENT

OF

HUGHES

TOOL COMPANY

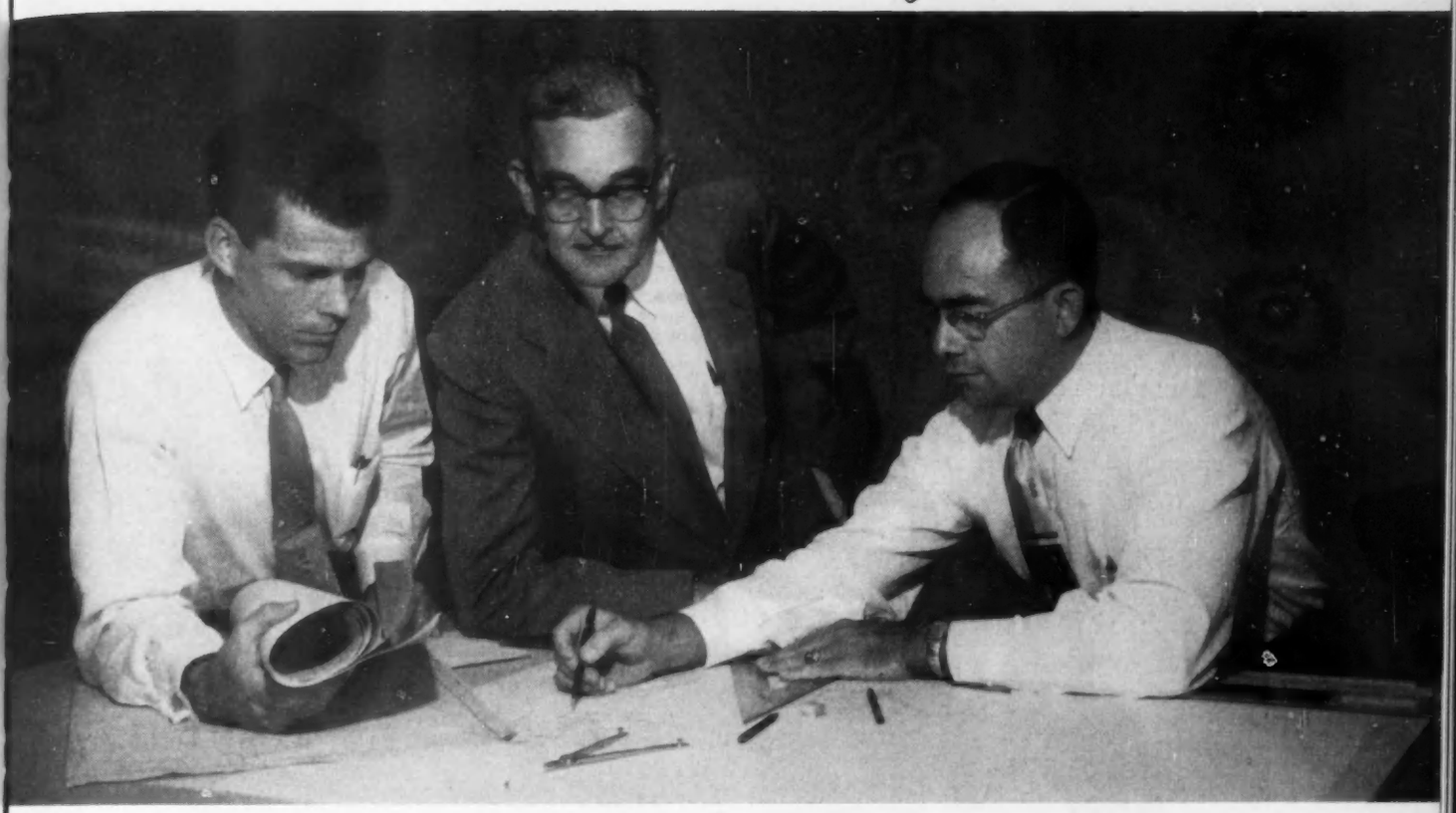
HOUSTON, TEXAS

We cover the "waterfront"

In rendering an *industry-wide* service, the more than 450 members of the Hughes sales and service organization cover the drilling "waterfront." That includes the remote and out-of-the-way places, as well as every active drilling area in the United States and Canada.

And what is more, bit deliveries are made to your rig... *ahead of time!* Why? Because the Hughes sales and service organization, working closely with the drilling industry, determines ... *far in advance* ... the bit requirements of each field and wildcat area ... thus assuring that the right sizes and types of bits will be available when needed.

It takes a certain kind of specialist...



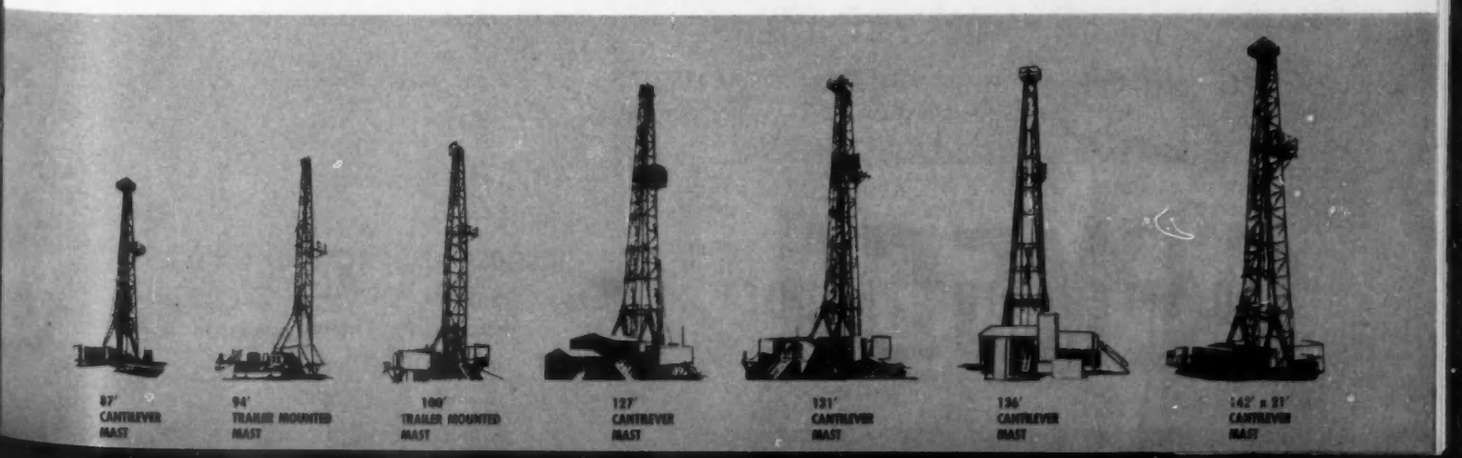
With experience to know the proper application of drilling structures.

Lee C. Moore design-engineers provide much of the "Know How" to apply the right Lee C. Moore structure to each type of drilling problem. Their years of experience provide a "strong link" in the progressive service that justifies the utmost confidence and dependability.

EXPORT OFFICE: ROOM 624 INTERNATIONAL BLDG.,
630 5TH AVENUE, NEW YORK 20, NEW YORK
FOREIGN LICENSED MANUFACTURER • OIL WELL ENGINEERING CO., LTD.
CHEADLE HEATH, STOCKPORT ENGLAND

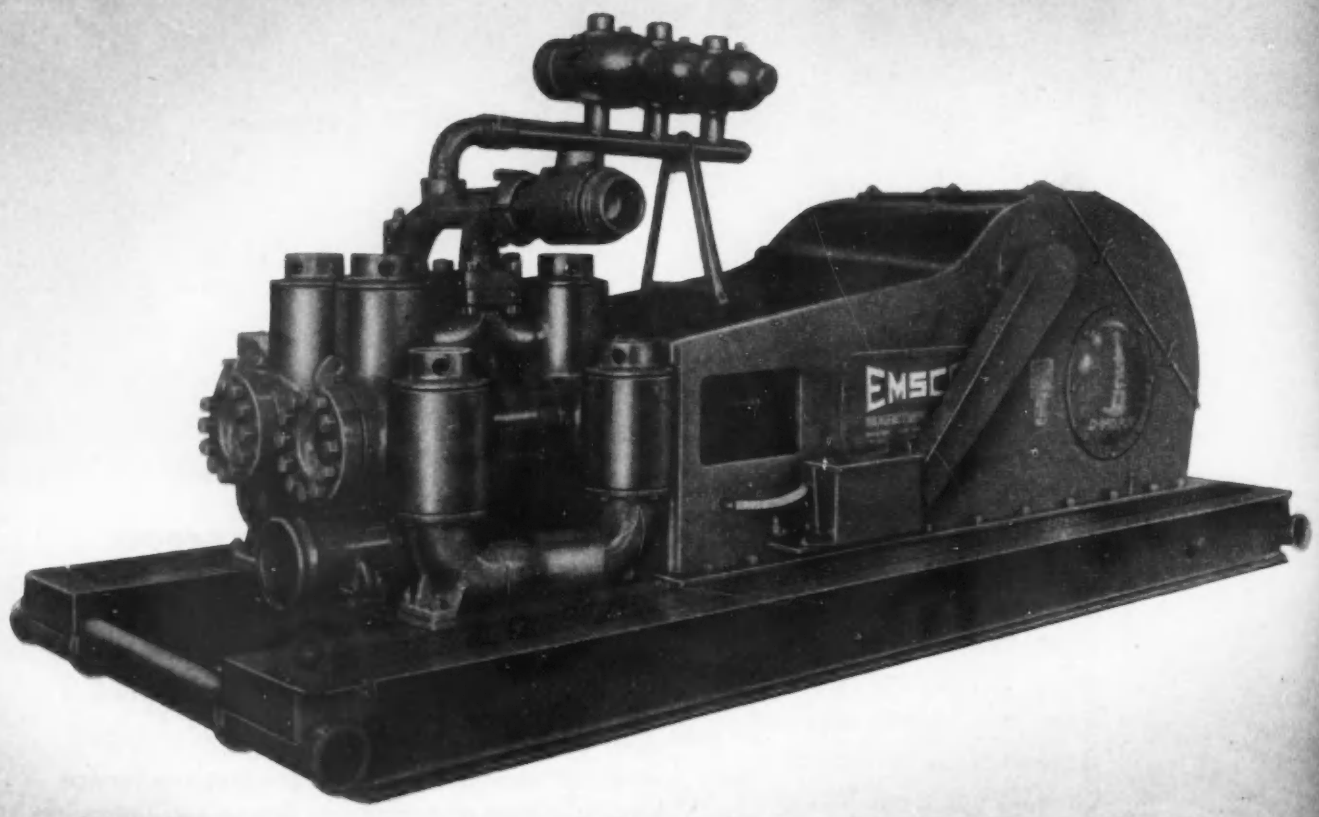
LEE C. Moore CORPORATION

TULSA - SHREVEPORT - GREAT BEND
CASPER - NEW ORLEANS - CENTRALIA - DALLAS
HOUSTON - MIDLAND - PITTSBURGH



For Jet Bit, Big Hole, Deep, Medium or Shallow Drilling

EMSCO POWER



Follow the lead of successful oil well drillers everywhere who depend on EMSCO Slush Pumps for rugged performance, low cost operation and minimum maintenance. To meet all mud circulating requirements, EMSCO Slush Pumps are designed in six models: D-175, D-300, D-500, D-700, D-850, and D-1000.

Operation and maintenance are simple and easy. **There are no adjustments to be made — no greasing to be done — lubrication is completely automatic.** You can detect and correct liner packer leakage before damage is done because of EMSCO's patented and exclusive "exposed" liner design.

For full details regarding dependable EMSCO Slush Pumps to meet your needs, call your nearest EMSCO representative.

EMSCO D+B

QUALITY IS OUR PRODUCT

EMSCO TRADEMARK

EMSCO MANUFACTURING COMPANY

Houston, Texas Los Angeles, Calif. Garland, Texas

General Sales Offices: Dallas, Texas

Magcobar means more
than mud alone ... it means ...
constant exploration
for new reserves
Adequate barite and bentonite reserves have become invaluable to the future of the oil industry. And locating and maintaining these high quality raw material deposits is just like finding new oil reserves: you have to go out and look for them years ahead to insure a dependable supply in the future.
Magcobar maintains a geological staff that has located the highest quality raw material deposits in the Western hemisphere. And the search continues day after day so that the oil industry can be assured of adequate drilling mud stocks in the future . . . from Magcobar.
Magcobar
Complete
DRILLING MUD SERVICE

Announcing

THE NEW JOY "5000" SERIES PORTABLE ROTARY DRILLS

IN TWO MODELS

THE "340"
for depths to 3400 ft.
of 8⅝" hole using 3½" drill pipe

THE "510"
for depths to 5100 ft.
of 8⅝" hole using 3½" drill pipe

● **AIR-OPERATED CLUTCHES THROUGHOUT** permit fast, effortless hoisting and lowering between trips.

● **AIR-OPERATED CONTROLS THROUGHOUT** provide air-cushioned, sensitive control of drum clutches, rotary drive and engine throttle with maximum ease of operation.

● **LARGER ROTARY TABLE** handles casing up to 18" O.D. and standard A.P.I. taper on the "*510*", and up to 10" O.D. and standard A.P.I. taper on the "*340*".

● **ENTIRE DRILL UNIT MOUNTED ON ONE TRAILER** reduces set-up and tear-down time and lowers cost.

● **ALLOY STEEL BRAKE FLANGES** have larger braking area and are bolted to drum for easy replacement.

● **HYDROMATIC BRAKE ON HOISTING DRUM,** standard equipment on "*510*" and optional on the "*340*", reduces excessive wear on brake linings and flanges throughout trip cycle, increases capacity to handle heavy loads, provides safer working conditions.

● **TORQUE CONVERTER** insures complete control of load at all times, delivers *three times* normal engine torque under stall conditions, permits engine to operate within its maximum power range under a wide variation of loads.

● **CLUTCHES ACTUATED BY JOY TYPE K AIR COMPRESSOR.**

For details on the new "*5000*" Series Joy Portable Rotary Drills write, today, to *Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.* In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Write for FREE Bulletin 78-30

Manufacturing and Service Facilities at 6540 Hines Blvd:, Dallas, Texas

Consult a Joy Engineer

For PORTABLE ROTARY DRILLS, AIR COMPRESSORS, GAS GATHERING COMPRESSORS, PORTABLE LIGHTING LINES

WSW 06045-78

JOY

WORLD'S LARGEST BUILDER OF PORTABLE ROTARY OIL FIELD DRILLS, CORE DRILLS, AND BLAST HOLE DRILLS

THE O·C·T C-20 CASING HEAD

lets you work in *Safety*

Regardless of how or when you decide to install the O-C-T "C-20" Casing Hanger . . . before cementing, after cementing, through preventers, under preventers, or at any time in case of stuck pipe . . . you can improve the safety of your completion operations and save hours of expensive rig time due to the flexible, simplified O-C-T installation procedure.

Let your O-C-T Representative give you all the details or write for complete information. Available through more than 700 supply store locations.

The first quick-setting, positive-sealing well head designed especially to eliminate open hole hazards in medium depth wells, the O-C-T "C-20" Casing Hanger can't forget to seal . . . because the sealing element, slip bowl and slips are assembled as a single unit that may be wrapped quickly around the casing, latched and dropped into place, eliminating the possibility of individual parts being installed incorrectly.

O·C·T

OIL CENTER TOOL CO.

P. O. Box 3091, Houston, Texas

Export Representatives: Sterling Areas—Le Grand, Sutcliff & Gell, Ltd., Rochester, Kent, England. South America—East West Oiltools, C. A., Del Lago Hotel, Maracaibo, Venezuela. Address Export Inquiries for All Other Countries to P. O. Box 3091, Houston, Texas.

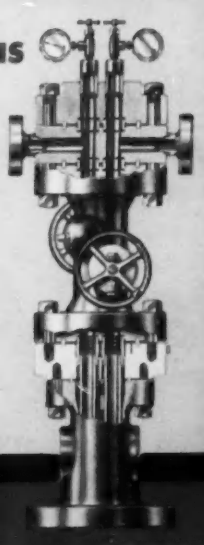
FOR DUAL COMPLETIONS

Specify

O·C·T

This compact Oil Center Tool Company Christmas Tree assembly provides a safe, strong and practical means to economical dual completions.

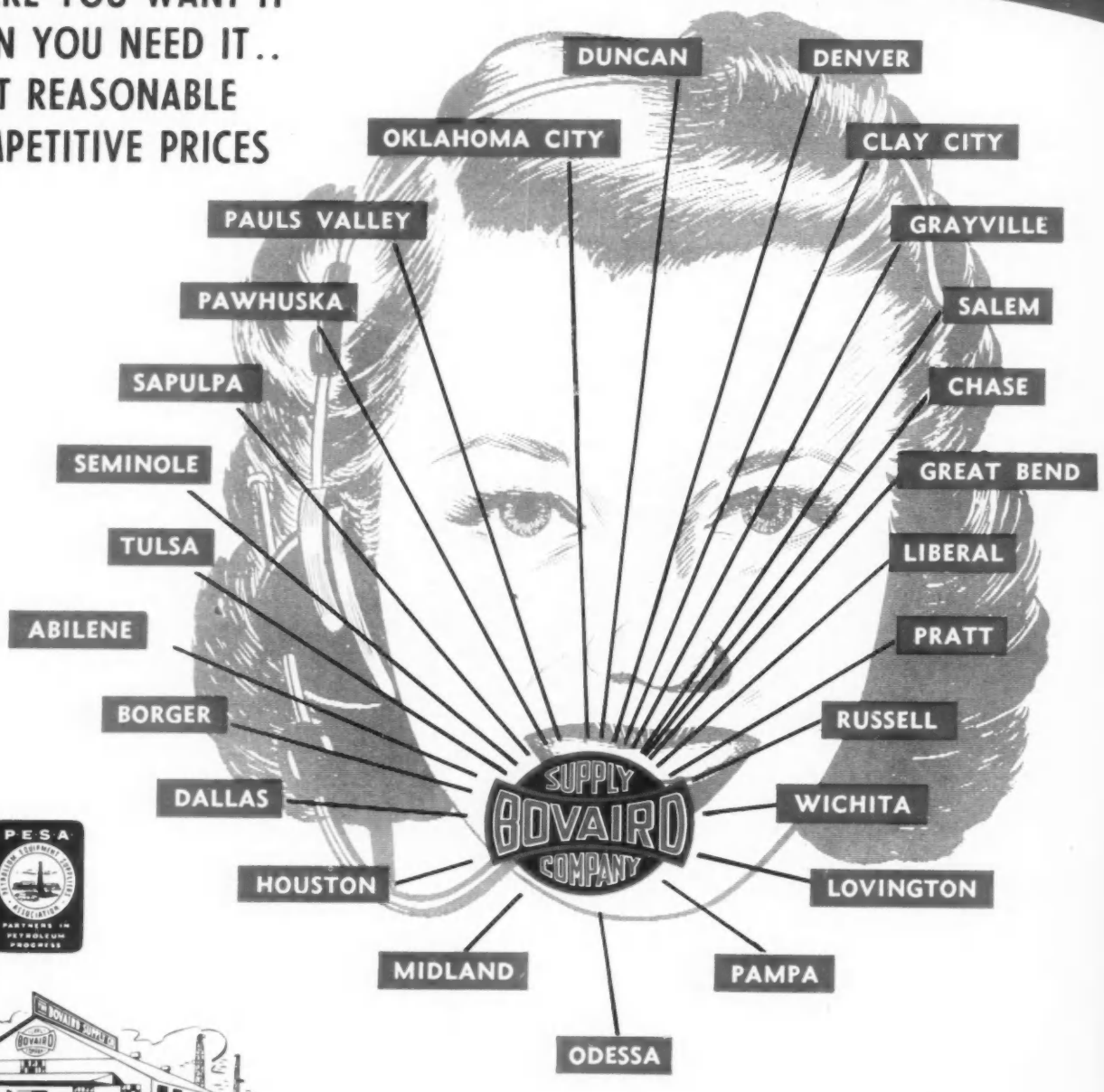
If you are considering dual completions, it will pay you to check the features and get the full story of this O-C-T Dual Completion Assembly.



ASK US FOR MORE INFORMATION

Where There's a WELL There's a Way...

TO GET WHAT YOU WANT
WHERE YOU WANT IT
WHEN YOU NEED IT..
AT REASONABLE
COMPETITIVE PRICES



P·E·S·A
PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION
PARTNERS IN PETROLEUM PROGRESS

JUST "Buy From Bovaird"

THE Bovaird SUPPLY COMPANY

GENERAL OFFICES
TULSA, OKLAHOMA

85 YEARS OF PROGRESS WITH THE OIL INDUSTRY

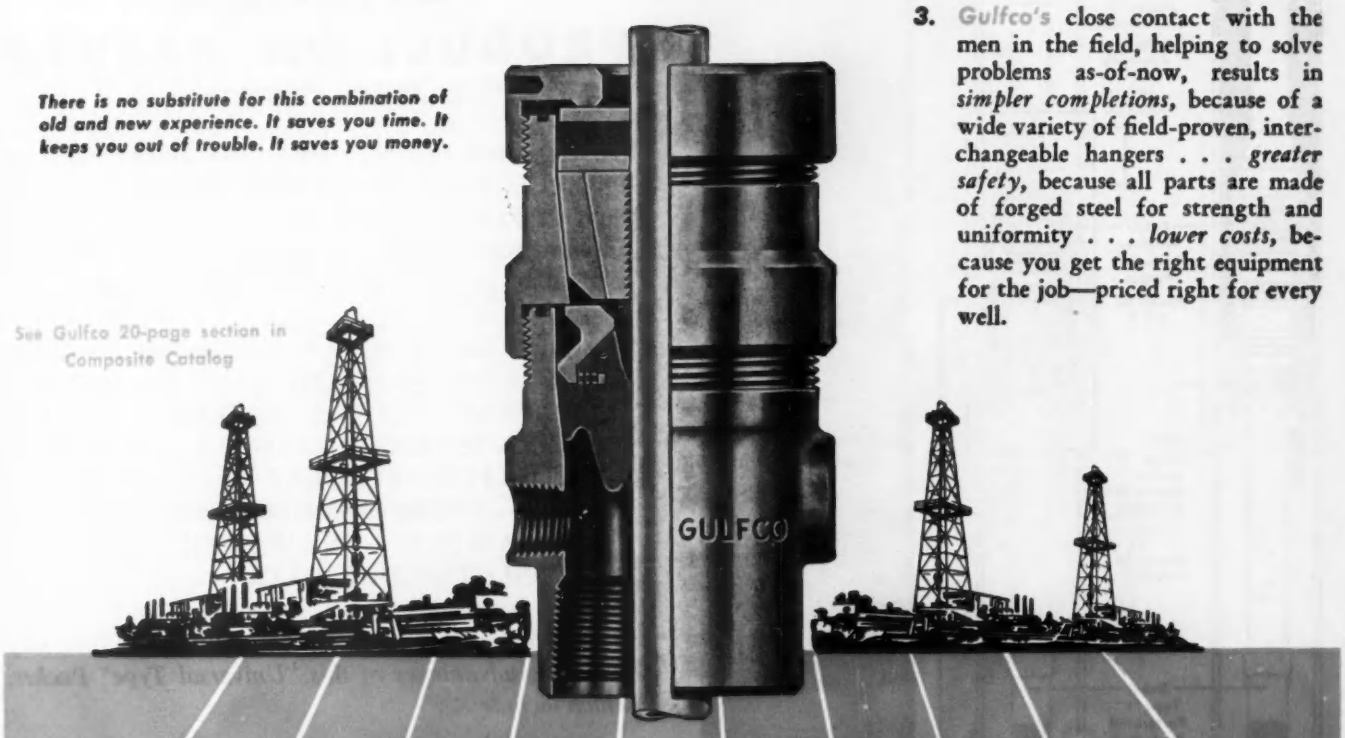
When you buy a New Gulf Head

. . . you get the advantages of the latest, up-to-the-minute Gulfco experience in the field . . . plus . . . the benefits resulting from Gulfco's third-of-a-century of oil industry experience.

1. Gulfco's research and development engineers keep Gulfco products modern.
2. Gulfco's 34 years' oil industry experience, pioneering the use of forged steel and other advancements in both material and methods, keeps Gulfco products safe.
3. Gulfco's close contact with the men in the field, helping to solve problems as-of-now, results in *simpler completions*, because of a wide variety of field-proven, interchangeable hangers . . . *greater safety*, because all parts are made of forged steel for strength and uniformity . . . *lower costs*, because you get the right equipment for the job—priced right for every well.

There is no substitute for this combination of old and new experience. It saves you time. It keeps you out of trouble. It saves you money.

See Gulfco 20-page section in Composite Catalog



SOLD EXCLUSIVELY THROUGH SUPPLY STORES

FORGED STEEL WELL HEAD EQUIPMENT . . . for Safety

GULF COAST MACHINE & SUPPLY CO.

GULF COAST MACHINE & SUPPLY CO. GULFCO TRADE MARK PRODUCTS BEAUMONT, TEXAS.

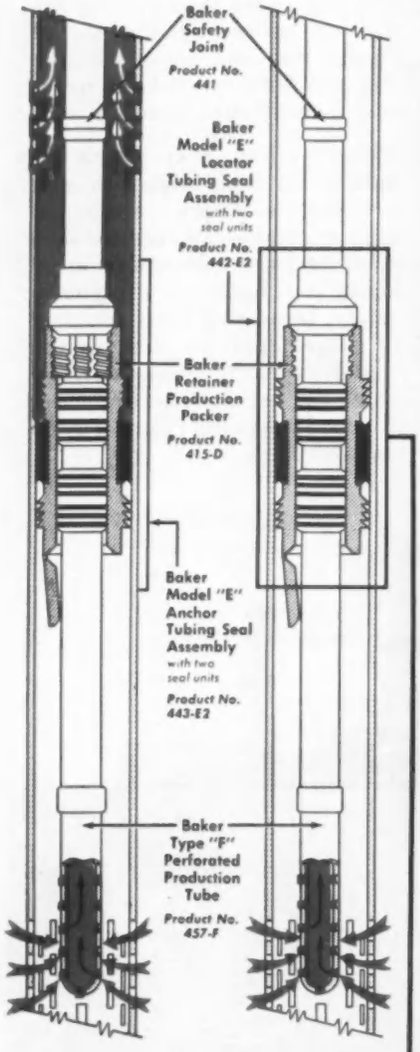
GENERAL OFFICE AND SHOP: 305-315 Orange Street, P. O. Box 1150—Phone 2-8481, Beaumont, Texas
SALES OFFICES AND WAREHOUSE STOCKS: Houston, Texas: 6823 Navigation Blvd., Ph. FA 3-1644
Corpus Christi, Texas: 3407 Agnes St., Ph. 2-5361 • Odessa, Texas: 207 N. Amburgey St., Ph. 2-2895
• Wichita Falls, Texas: 1213 Indiana St., Ph. 2-9407 • Casper, Wyo.: 630 Yellowstone St., Ph. 2-0809
• Great Bend, Kansas: East 10th St., Ph. 4341 • Seminole, Oklahoma: 1001 North 1st St., Ph. 376
• Oklahoma City, Oklahoma: 700 N. Meridian, Ph. Windsor 3-4515.
DISTRICT SALES OFFICE: Dallas, Texas: 534 Fidelity Union Life Bldg., Ph. Randolph 6698
NEW YORK EXPORT OFFICE: E. S. Stokvis & Sons, Inc., 17 Battery Place, New York 4, N. Y.

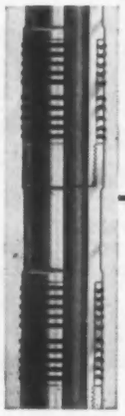
See Gulfco's 20-page section in the Composite Catalog.

Single Zone Dual Zone PRODUCTION

WITH 1 BAKER

RETAINER PRODUCTION PACKER


Baker Safety Joint
Product No. 441
Baker Model "E" Locator Tubing Seal Assembly with two seal units
Product No. 442-E2
Baker Retainer Production Packer
Product No. 415-D
Baker Model "E" Anchor Tubing Seal Assembly with two seal units
Product No. 443-E2
Baker Type "F" Perforated Production Tube
Product No. 457-F
TYPICAL DUAL ZONE HOOKUP
TYPICAL SINGLE ZONE HOOKUP



Right: Picture shows actual detail of seal units

Do you know that with only ONE Baker Retainer Production Packer you can equip your well for *either* SINGLE ZONE or DUAL ZONE production? And that you can accomplish *any* type of completion for *any* method of production to meet *fixed* or *changing* well conditions?

A single Baker Retainer Production Packer will also outperform many specialized tools when used as a TESTING PACKER – SQUEEZE PACKER – GAS LIFT PACKER – PERMANENT COMPLETION PACKER – WATER FLOOD PACKER – GAS INJECTION PACKER – CORROSION CONTROL PACKER – TUBING ANCHOR – ONE-WAY BRIDGE PLUG – PERMANENT BRIDGE PLUG.

Every production man should be familiar with the many operating advantages of this "Universal Type" Packer, which include . . .

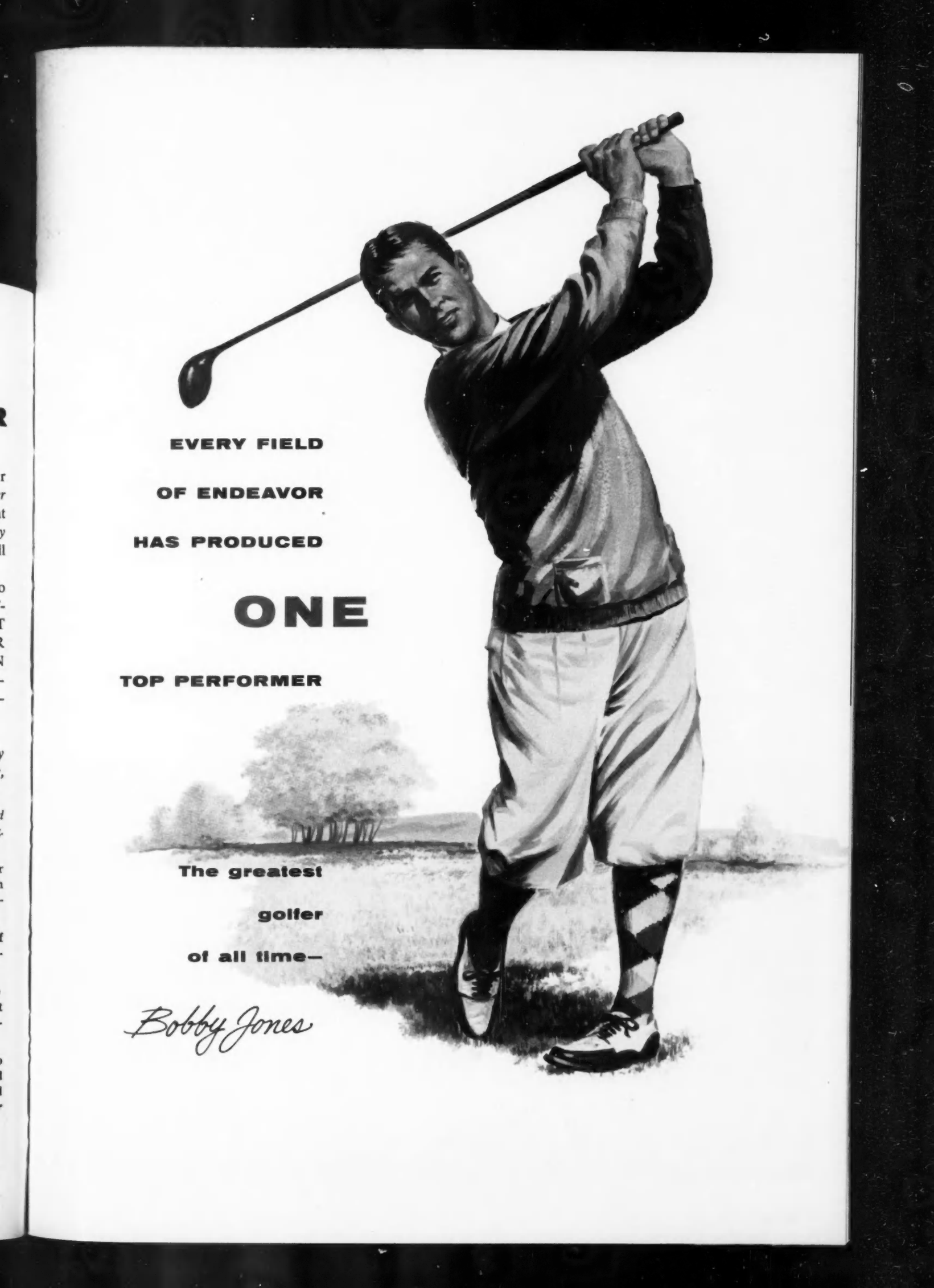
WIRE LINE SETTING – The packer can be set with *wire line speed and accuracy*, using the same set-up just used for perforating. The Baker Packer also can be set on drill pipe or tubing.

SETTING UNDER HIGH PRESSURE – By using a lubricator, the Baker Retainer Production Packer can be set under high pressure. From the moment it is set, the self-contained, flapper-type, back-pressure valve closes and isolates pressure below the packer.

TUBING STRING IS ALWAYS "FREE" – That valuable string of tubing – whether 1,000 feet or 16,000 feet in length – can be removed by simply picking up the tubing weight.

EXCESSIVE "SET-DOWN" WEIGHT OR TENSION NOT REQUIRED – Even when squeezing, formation fracturing, or producing at any depth under pressure, a perfect pack-off is maintained independent of excessive set-down weight, or tension.

HOLDS PRESSURE DIFFERENTIALS FROM ABOVE OR BELOW – Two sets of opposed slips, and a resilient packing confined by lead and metallic sealing rings, effect a permanent pack-off that will hold any pressure differential *either from above or below the packer* that is safe for the well equipment.


EVERY FIELD
OF ENDEAVOR
HAS PRODUCED
ONE
TOP PERFORMER
The greatest
golfer
of all time—
Bobby Jones

EVERY FIELD OF ENDEAVOR

HAS PRODUCED **ONE** TOP PERFORMER

In golf it was Bobby Jones

For pumping dirty oil wells it is the

oilmaster

MULTIPLE TUBE PUMP

Its design and general construction can, has and will be copied, but THIRTY YEARS OF EXPERIENCE and KNOW-HOW in this field of endeavor are the exclusive property of FLUID PACKED PUMP CO.

FREE REPRINT AVAILABLE
Reprints of the illustration of Bobby Jones without advertising sent on request

FLUID PACKED PUMP CO.
Main Office and Plant, Los Nietos, Calif.

Distributed by the National Supply Co., Pittsburgh, Pennsylvania • Export: The National Supply Co., Export Division, 600 Fifth Ave., New York • Co-Distributors: Berry Supply Store, Beacon Supply Co., Industrial Supply Co.

oilmaster PUMPS
FOREMOST IN THE INDUSTRY

BEAIRD-INGERSOLL-RAND

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed

HOUSTON NATURAL GAS CORPORATION ODEM FIELD COMPRESSOR STATION—equipped with two Beaird-Ingersoll-Rand 660 h.p. 12SVG four cycle gas engine driven compressors, Young radiators, lubricating oil coolers and gas coolers, and all necessary controls. Other sizes 110 to 660 h.p.

Quick Installation –

PACKAGED COMPRESSORS SUPPLY NEEDED RESERVES

Houston Natural Gas Corporation built this compressor station in Odem Field, Texas, to boost natural gas to lines serving the expanding Corpus Christi area. Equipped with two 660 h.p. Beaird-Ingersoll-Rand 12SVG packaged units, it is capable of handling 12 mmcfd. Utilizing packaged compressors minimized field assembly and added needed reserves at a saving in both time and cost of installation.

Operating with two stages of compression, the units pick up gas from nearby wells at 50 psig. and boost it to the line at 325 psig. Automatic controls built into the compressors prevent suction pressures from being pulled below 50 psig. required for efficient operation of the separators. Flexible in design, the units can be converted to three-stage compression to follow the pressure on down as the field grows older. When reserves are depleted the compressors can be moved to other service and nearly all of the present installation salvaged for re-use at the new location.

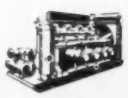
Let us show you how complete packaging simplifies installation and reduces field assembly costs.

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

MACHINING
MANUFACTURING
STEEL WAREHOUSE

BEAIRD



PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

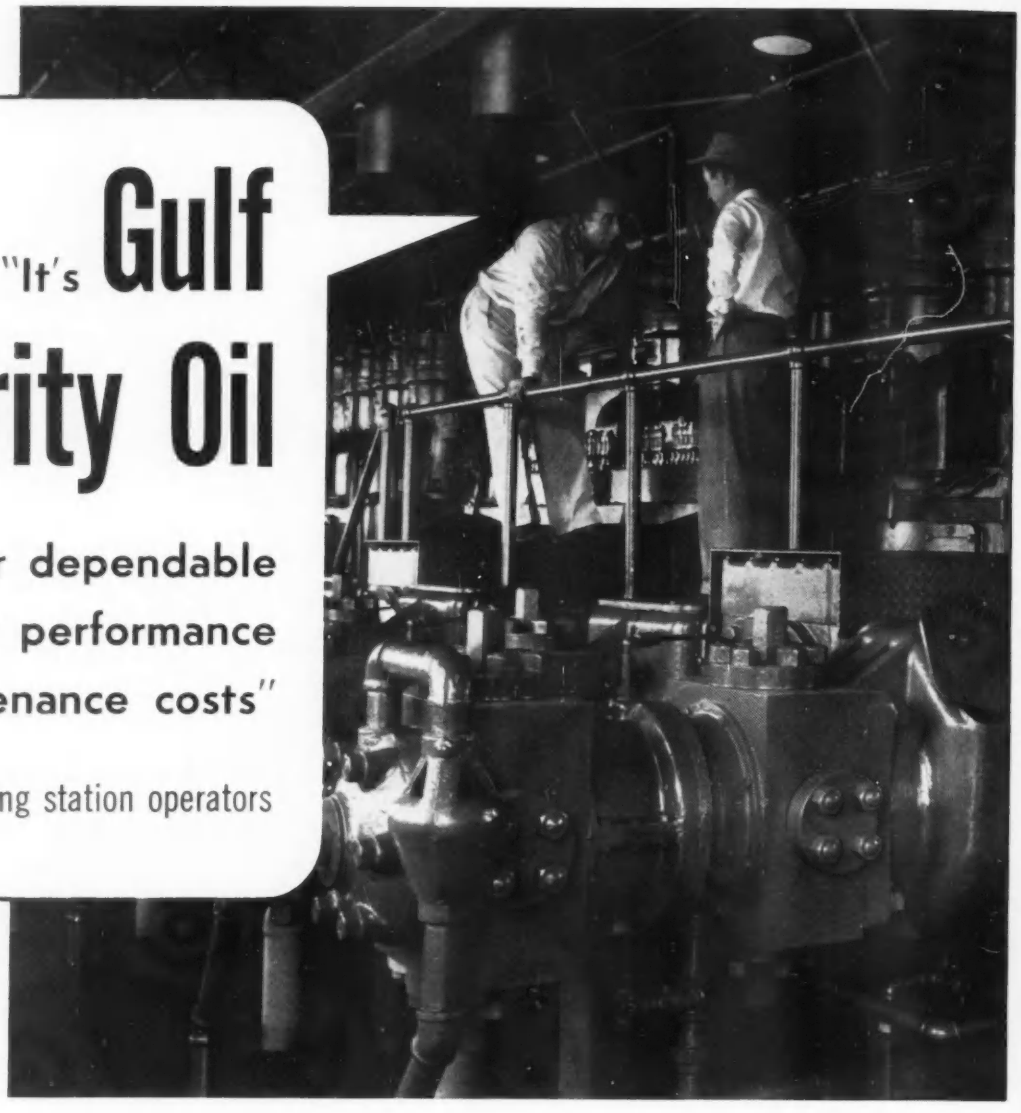
PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS

Sales offices: *Dallas, Houston, Corpus Christi and Midland, Texas; Tulsa, Oklahoma; Denver, Colorado; Los Angeles, California, and Cie. Ingersoll-Rand, Paris, France.*

"It's Gulf
Security Oil
for dependable
gas compressor performance
and low maintenance costs"
say pumping station operators



Smooth, continuous operation is a must for these units in service at a South Texas gas compressor plant. They are responsible for the steady flow of essential natural gas through pipe lines to homes and industries as far north as Detroit and New York. Gulf Security Oil provides the sure, effective protection needed for cylinders and bearings in both engines and compressors.

You can depend on Gulf Security Oil to provide the proper lubrication that is so important to vital compressor units if operating troubles are to be prevented and maintenance costs kept low.

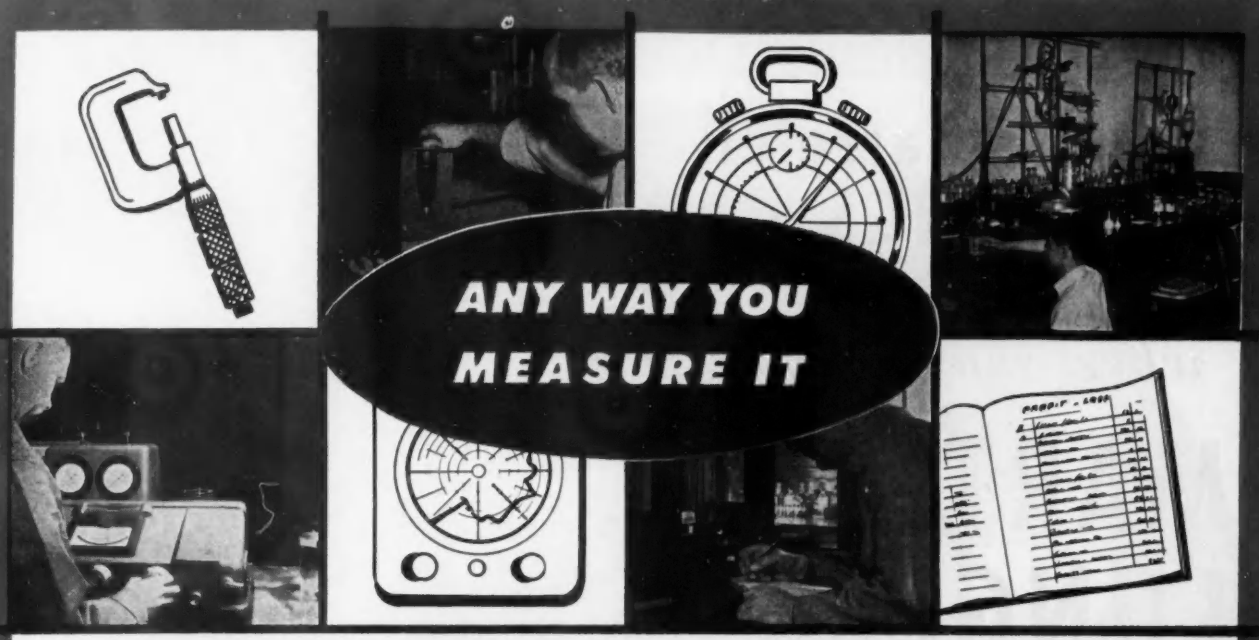
Gulf Security Oil has a record of outstanding performance in scores of gas transmission plants. After years of operation with this quality oil, the cylinders and piston rings of both the compressors and power assemblies show negligible wear. And few carbon deposits have formed on power cylinder ports and pistons.

If you are installing new compressor units, or feel that you're not getting the most effective lubrication possible for your present units, it will certainly pay you to try Gulf Security Oil. Contact your nearest Gulf Office and have a Gulf Sales Engineer call.

Gulf Oil Corporation • Gulf Refining Company
1822 GULF BUILDING, PITTSBURGH 30, PENNSYLVANIA

GULF

The finest petroleum products for your every need



ANY WAY YOU MEASURE IT

TRETOLITE PERFORMANCE IS CONSISTENTLY SUPERIOR

TRETOLITE COMPANY
A DIVISION OF PETROLITE CORPORATION
369 Marshall Avenue, St. Louis 19, Missouri
5515 Telegraph Road, Los Angeles 22, California

TRETOLITE'S CONSISTENTLY SUPERIOR PERFORMANCE IS AVAILABLE TO THE INDUSTRY IN PROBLEMS CONCERNING . . .

EMULSIFICATION
Demulsifiers

SCALE
Scale Preventives

CORROSION
Corrosion Inhibitors

BACTERIA (Secondary Recovery)
Bactericide

WATER / MUD BLOCKS
Production Stimulator

SALT
Desalting

ASPHALT STRIPPING
Asphalt Additive

POLLUTION
Water De-Oilers

TRETOLITE SERVICE IS THE KEY TO SUPERIOR PERFORMANCE

AP 5510

Double-Barreled SAVINGS . . .

when you use

MARTIN PLUNGERS

1 SAVE ON PLUNGER COSTS

One Martin Plunger will make many long runs, with only the rings being replaced. A set of rings costs only one fourth as much as a new plunger. Thus it is easy to figure the savings on the plunger alone.

2 SAVE ON BARREL COSTS

Metal to metal wear is eliminated. The resilient rubber & duck rings are so much easier on the barrel surface that barrels usually last several times longer. Here too is an important item in pump costs.

MORE BARRELS IN THE TANK TOO because of better seal, freer travel in the barrel and longer runs. AVAILABLE for your pump and your well, regardless of diameter, or depth or well condition. Get catalog No. 4 and read how to make selection and installation.

MARTIN PLUNGERS ARE SOLD THRU SUPPLY COMPANIES

JOHN N. MARTIN

Manufacturer

9 W. BRADY • TULSA, OKLA.

(For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Here's why this is the world's number one Tong!

BJ

TYPE "B" TONG

EASY LATERAL ADJUSTMENT. A turn of the hex nut moves the suspension ring right or left for perfect lateral balance.

INHERENT BALANCE. BJ patented Gooseneck Hanger combines streamlined design with perfect balance to give the tong a "floating" action.

LONGITUDINAL BALANCE IS SIMPLE MATTER of adjusting set screw at base of hanger.

FITS ALL PIPE SIZES FROM 3½" to 13⅜" by changing to the proper size latch lug jaw.

QUICK-CHANGE LATCH LUG JAWS. The straight hinge pin that retains the jaw is easily removed, permitting fast changes.

HANDY ADJUSTABLE STOP limits the travel of the latch jaw... gives fast grip when tonging small pipe... trips to open jaw wide when large-diameter pipe is being handled.

STRONGER HINGE CONSTRUCTION. Greater strength is provided by large, oversize 1¾" threaded hinge pins double-slotted and doweled against rotation, adjustable to compensate for wear.

BJ RED TOP TONG DIES WEAR LONGER... take a better bite... have extra hardness and chip-proof ends... are tapered for fast changes of dies.

There's no secret why more BJ Type "B" Tongs are used in the oil fields *than all other makes combined*. The popularity of these tongs is based on their balanced suspension, easy latching and rugged construction. These features tell the story.

SINCE BJ 1872

Byron Jackson

Division of Borg-Warner Corporation

P. O. BOX 2017A, TERMINAL ANNEX • LOS ANGELES 54, CALIFORNIA

VISCO
REG. U.S. PAT. OFF.
CORROSION
987
INHIBITOR
55 U. S. GALLONS
VISCO PRODUCTS CO. Inc.
HOUSTON, TEXAS

BAASH-ROSS HINGED CASING SPIDER

simplifies any casing operation

Lightweight —yet ample strength for longest and heaviest casing strings!

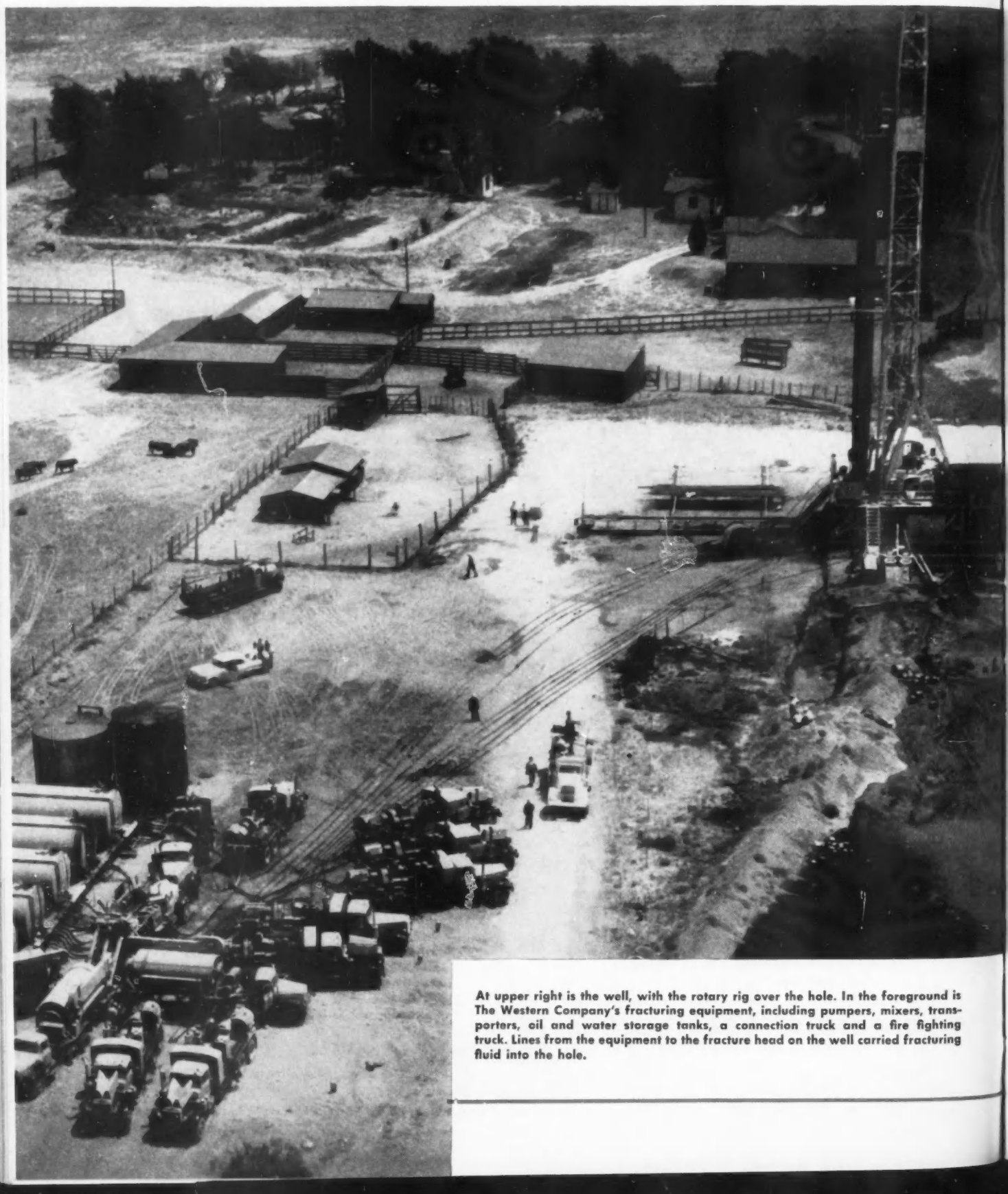
- Can be placed on cribbing . . . or on rotary table . . . or in place of it.
- Handles any casing operation and is ideal for running wash-over strings.
- Interchangeable bushings provide wide choice of slips . . . rotary slips . . . "UC" Slips . . . and others.
- Remove one or both pins for easy installation . . . easy handling . . . convenient transportation.

BAASH-ROSS TOOL COMPANY

DIVISION OF JOY MANUFACTURING COMPANY

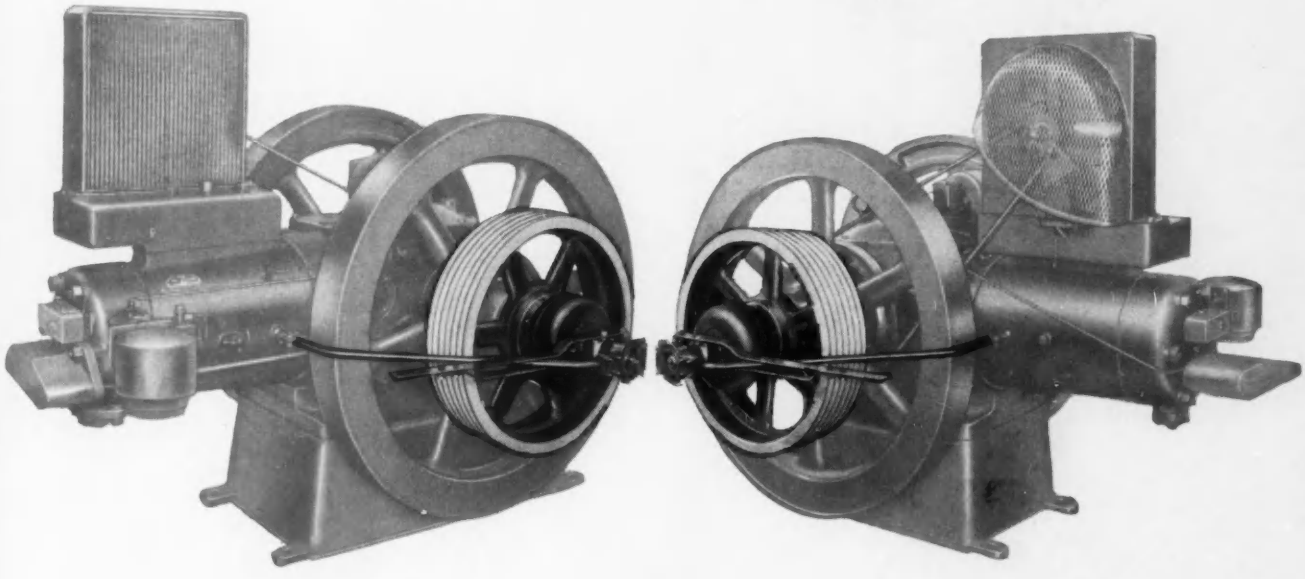
Los Angeles, Calif. • Houston, Texas • Odessa, Texas • Oklahoma City, Okla. • Casper, Wyo. • Olney, Ill. • Edmonton, Alb., Canada • New York City

"Frac" job brings in Headlee
13,500 feet of NATIONAL



At upper right is the well, with the rotary rig over the hole. In the foreground is The Western Company's fracturing equipment, including pumpers, mixers, transporters, oil and water storage tanks, a connection truck and a fire fighting truck. Lines from the equipment to the fracture head on the well carried fracturing fluid into the hole.

Here...or here...



on the "ZC"

The clutch and sheave can be mounted on either end of your Fairbanks-Morse ZC engine crankshaft—whichever end will position the engine most conveniently on the floor plan of your pumping rig. This feature, unique in the ZC, makes for safety of operation and ease of service.

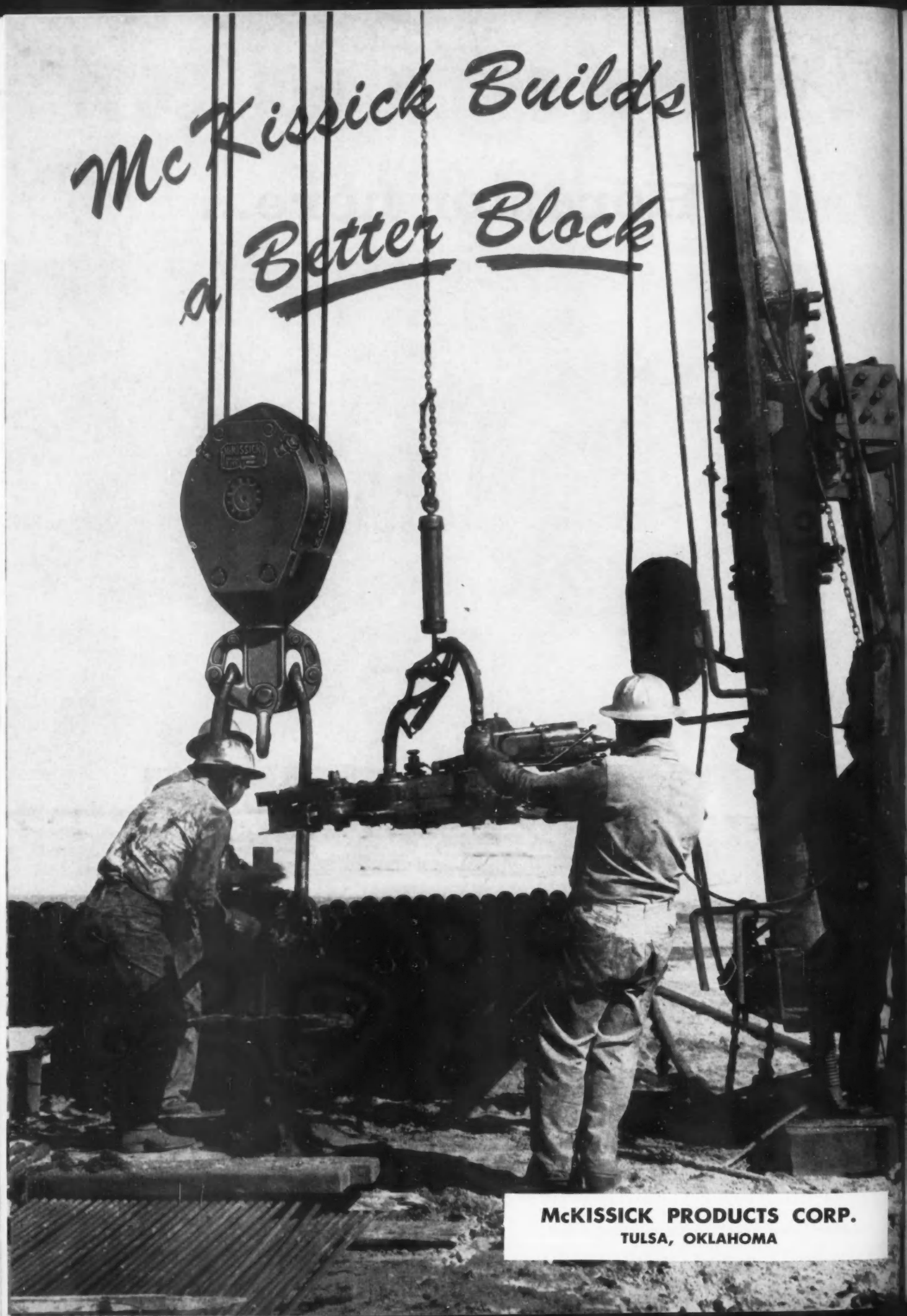
The Fairbanks-Morse ZC engine has TWO flywheels. However you mount the clutch and sheave, there will be the smoothing effect of a flywheel between the engine and the fluctuating power demand of the pump jack. This makes for better balance and more economical operation.

There are six sizes of ZC engines, from three horsepower to 30. See your local supply store or write Fairbanks, Morse & Co., Oil Field Division, 600 South Michigan Avenue, Chicago 5, Illinois.

FAIRBANKS-MORSE

a name worth remembering when you want the BEST

OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES



McKISSICK PRODUCTS CORP.
TULSA, OKLAHOMA

Men and equipment team up

for the record!

On December 6, 1955, Richardson and Bass Rig Number 25 drilling the Richardson and Bass (Louisiana Account), John W. Mecom, and Freeport Sulphur No. 1-L, LL&E-State Lease 2414, a Lake Washington wildcat in Plaquemines Parish, Louisiana, spun a Reed Rock Bit into a sand and shale formation at a total depth of 22,559 feet . . . the deepest point man has ever penetrated the earth.

It is a tribute to the courage of the men who made the decision to drill the well and to the entire oil industry that this unprecedented depth was reached in a commercial venture, paid for by risk capital earned under a free enterprise system. The discovery of new oil producing horizons at such depth could add greatly to our nation's store of natural resources.

The world's deepest well is a significant credit to the men who backed it, the men who drilled it and, in smaller measure, to the manufacturers who made the drilling tools.

(Note) On January 8, 1956, a Reed Rock Bit was used to deepen the hole eleven feet to a total depth of 22,570 feet.

REED

ROLLER BIT COMPANY

HOUSTON 1, TEXAS

NEW YORK LONDON BUENOS AIRES

Richardson and Bass crews

drill world's de

using Reed Rock Bits

On the page opposite are pictured the handful of men whose skill and ingenuity in handling rotary oilwell drilling tools enabled them to drill the world's deepest well. With Richardson and Bass Rig 25 they drilled 22,559 feet into the earth without making the slightest error which could have resulted in serious trouble or loss of the hole.

73 REED ROCK BITS USED

Shown below are the last five used from 22,027 feet to 22,559 feet. Sixty-three Reed cross roller Rock Bits were used below 14,000 feet. (See complete bit record on next page.) Three Reed Drill Collars were used in the drill string.

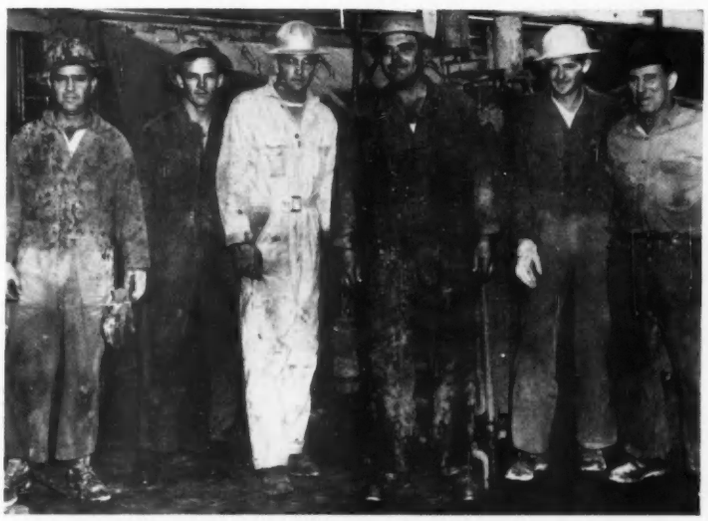
(Note) On January 8, 1956, a Reed Rock Bit was used to deepen the hole eleven feet to a total depth of 22,570 feet.

REED

epest well

most of the way!

G. G. "Pinky" Jordan, toolpusher, a veteran Richardson and Bass hand whose job it was to keep Rig 25 "drilling ahead" on the record-setting well.



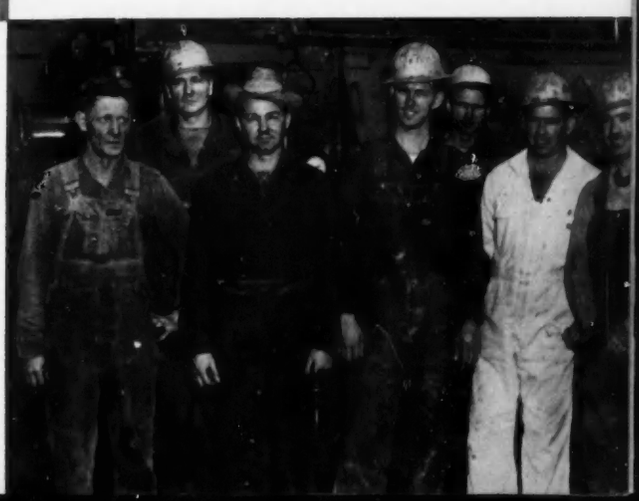
Crew, Rig 25, left to right: F. A. Mobley, helper; M. J. Gondrella, derrickman; J. E. Steinwinder, driller; E. N. Steele, Jr., helper; B. S. Whitfield, helper; W. C. Jackson, fireman.

Rex Haile, left, and Bill Kenny, right, Richardson and Bass mud engineers who were on duty alternately each day Rig 25 was drilling the world-record well.

(Above) Crew, Rig 25, left to right: L. J. Breaux, derrickman; T. V. Wallace, fireman; Billy Van Winkle, driller; E. W. Warrick, helper; R. D. Mark, helper; S. E. Ellington, helper.

(Right) Crew, Rig 25, left to right: M. B. McDaniel, welder; T. A. Hambrice, helper; George Fruge, fireman; L. J. Seneca, derrickman; C. V. Peeler, helper; H. D. Wright, driller; R. C. Wright, helper.

Shown above are three 4⅛-inch O. D. Reed Drill Collars used in the drill string on Rig 25 while drilling the world's deepest well.



ROLLER BIT COMPANY

HOUSTON 1, TEXAS

The record speaks for itself!

FORM No. JB-101
1/1/53

SPUDDED: 2-27-55
UNDER SURFACE: 3-3-55
INTER: 9-16-55
22,559': 12-6-55

A.P.I. BIT QUESTIONAIRE

Oil Company RICHARDSON & BASS (Ltd. Acct.) Well L.A. LAND & EXPLORATION #1-L Contractor SAME RIG #25

Date Spudded FEB. 27, 1955 Field ~~Root Sand Bluff~~ LAKE WASHINGTON WILDCAT County PLAQUEMINE State LA.

Drill Pipe O.D. _____ Tool Joint Type _____

Type Rig - Steam ✓ or Power _____ Mud Type LIME BASE OIL EMULSION 10% OIL

Drill Collars { Length 90 O.D. 8" I.D. _____ Interval 0-13665
Length 90' O.D. 5 3/4" I.D. _____ Interval 13665-19752
90' 4 1/8" 19752-22559

5 LUCEY 150 BOILERS STEAM PRESS. - 256 PSI

TOOL PUSHER -

Observed Data

Bit No.	Bit Size	Bit Mfgr.	Bit Type	Jet-J Reg-R	Watercourses No.	Watercourses Size	Depth Out	Footage	Hours Drld.	Feet per Hour	Bit Weight (000 #)	Table RPM	Mud Wt.	Mud Vis.	Deviation	Pump No. Liner	Pump No. SPM	Pump No. GPM	Pump No. Liner	Pump No. SPM	Pump No. GPM	Pump * Operation	Pump Press.	Total GPM	Nozzle Vel.
1	26	HUNT	3-WAY				300																		
2	12 1/4	HTC	OSC-3	J			3007	2707	11 3/4														1000		
3	17 1/2	REED	2-CTTR	D																					

Bit No.	Bit Size	Bit Mfgr.	Bit Type	Jet-J Reg-R	Watercourses No.	Watercourses Size	Depth Out	Footage	Hours Drld.	Feet per Hour	Bit Weight (000 #)	Table RPM	Mud Wt.	Mud Vis.	Deviation	Pump No. Liner	Pump No. SPM	Pump No. GPM	Pump No. Liner	Pump No. SPM	Pump No. GPM	Pump * Operation	Pump Press.	Total GPM	Nozzle Vel.
41	12 1/4	REED	LT-3	J	2	3/4	12917	104	18 1/4																
42	✓	HTC	OSC-3	J			13032	115	13 1/4																
43	✓	✓	✓	✓			13189	157	16																
44	✓	✓	✓	✓			13326	137	16 3/4																
45	✓	✓	✓	✓			13584	258	26 1/4																
46	✓	✓	✓	✓			13665	81	12																
47	✓	✓	✓	✓	RERUN		13665																		
48	8 3/8	REED	T	✓	2	3/4	NO RUN																		
49	✓	✓	✓	✓	✓	✓	13838	173	25 1/4																
50	✓	✓	✓	✓	✓	✓	14049	211	27 1/4																
51	✓	HTC	OSC-3	✓	✓	✓	14366	317	46 1/2																
52	✓	REED	T	✓	2	3/4	14562	196	26																
53	✓	✓	✓	✓	✓	✓	14842	280	40																
54	✓	✓	✓	✓	✓	✓	15064	222	38 1/2																
55	✓	✓	✓	✓	✓	✓	15265	201	37 3/4																
56	✓	✓	✓	✓	✓	✓	15482	217	36 1/2																
57	✓	✓	✓	✓	✓	✓	15709	227	38																
58	✓	✓	✓	✓	✓	✓	15985	245	45																
59	✓	✓	✓	✓	✓	✓	16197	212	38																
60	✓	✓	✓	✓	✓	✓	16422	225	38 3/4																
61	✓	✓	✓	✓	✓	✓	16638	216	35 1/2																
62	✓	✓	✓	✓	✓	✓	16763	125	23 1/2																
63	✓	✓	2HM	✓	✓	✓	16959	196	34 1/2																
64	✓	✓	2HS-7	✓	✓	✓	17116	157	27 1/2																
65	✓	✓	2HM	✓	✓	✓	17306	190	35 1/2																
66	✓	✓	✓	✓	✓	✓	17427	111	23 1/2																
67	✓	✓	✓	✓	✓	✓	17567	135	25 1/2																
68	✓	✓	2HS-1	✓	✓	✓	17677	110	19																
69	✓	✓	✓	✓	✓	✓	17791	114	20 1/4																
70	✓	✓	✓	✓	✓	✓	17900	109	22 1/4																
71	✓	✓	✓	✓	✓	✓	18075	175	33																
72	✓	✓	✓	✓	✓	✓	18265	190	32 1/2																
73	✓	✓	✓	✓	✓	✓	18466	201	38																
74	✓	✓	✓	✓	✓	✓	18606	140	27 1/2																
75	✓	✓	✓	✓	✓	✓	18705	99	21 1/2																
76	✓	✓	✓	✓	✓	✓	18935	230	47																
77	✓	✓	✓	✓	✓	✓	19116	181	40 1/2																
78	✓	✓	✓	✓	✓	✓	19343	227	42 3/4																
79	✓	✓	✓	✓	✓	✓	19550	207	38 1/2																
80	✓	✓	✓	✓	✓	✓																			

* Pump Operation: S - Single; P - Parallel; C - Compound.
** Hydraulic HP based on 85% Efficiency.

Bit No.	Bit Size	Bit Mfgr.	Bit Type	Jet-J Reg-R	Watercourses No.	Watercourses Size	Depth Out	Footage	Hours Drld.	Feet per Hour
81	8 3/8	REED	2HS-1	J	2	3/4	19743	193	38	
82	✓	✓	✓	✓	✓	✓	19752	9	2	REAM
83	6	✓	2C	R			17422	1444	30	
84	✓	✓	✓	✓			18837	1415	30	DRILL CEMENT
85	✓	✓	T	✓			19690	853	20 1/2	
86	✓	✓	2C	✓	DRILLING UP PACKERS, CONDITIONING HOLE, ETC.					
87	✓	✓	✓	✓						
88	✓	✓	✓	✓						
89	~~✓~~	~~✓~~	~~✓~~	~~✓~~						
90	✓	HTC	CWS	✓			19732	47	9 3/4	
91	✓	REED	2C	✓			19905	125	25 1/4	
92	✓	✓	✓	✓			20071	166	33	
93	✓	✓	✓	✓			20188	117	26	
94	✓	✓	✓	✓			20291	103	26 1/2	
95	✓	✓	✓	✓			20415	124	30	
96	✓	✓	✓	✓			20515	100	23 1/2	
97	✓	✓	✓	✓			20579	64	21	
98	✓	✓	✓	✓			20636	77	23	
99	✓	✓	✓	✓			20692	36	14 1/4	
100	5 1/4	HTC	W7R	✓	CHRISTENSON CORE BIT		20729	37	15	
101	5 1/4	CHRISTENSON CORE BIT					20753	24		
102	✓	✓	✓	✓	✓	✓	20757	4		
103	6	REED	2C	R			20778	21	8	
104	5 1/4	CORE BIT					20791	13	12	
105	6	REED	2C	R			20814	23	13	
106	✓	✓	✓	✓			20849	35	23	
107	✓	✓	✓	✓			20900	51	27	
108	✓	✓	✓	✓			20956	56	28	
109	✓	✓	✓	✓			20992	36	19 1/2	
110	✓	✓	✓	✓			21018	26	16	
111	✓	✓	✓	✓			21085	67	29	
112	✓	✓	✓	✓			21183	98	36	
113	✓	✓	✓	✓			21234	51	18 1/2	
114	✓	✓	✓	✓			21253	17	16 1/2	
115	✓	✓	✓	✓			21336	83	30	
116	✓	✓	✓	✓			21407	71	30	
117	✓	✓	✓	✓			21463	56	27 1/2	
118	✓	HTC	W7R	✓			21506	43	19	
119	✓	REED	2C	✓			21605	99	35 1/2	
120	✓	✓	✓	✓			21703	98	33 1/2	

* Pump Operation: S - Single; P - Parallel.
** Hydraulic HP Based

Bit No.	Bit Size	Bit Mfgr.	Bit Type	Jet-J Reg-R	Watercourses No.	Watercourses Size	Depth Out	Footage	Hours Drld.	Feet per Hour	Bit Weight	Table RPM	Mud Wt.	Mud Vis.
121	6	REED	2C	R			21806	103	36				18.1	74
122	✓	✓	✓	✓			21920	116	42					
123	✓	✓	✓	✓			22027	107	36					
124	✓	✓	✓	✓			22127	100	38 1/4				18.0	66
125	✓	✓	✓	✓			22249	122	48				18.0	66
126	✓	✓	✓	✓			22350	101	37					
127	✓	✓	✓	✓			22447	97	37 1/2					
128	✓	✓	✓	✓			22559	112	41 3/4	•	Reached		12	

REED
ROLLER BIT
COMPANY
HOUSTON 1, TEXAS
New York • London • Buenos Aires

KINNEY Heliquad Gear Pump

AURORA Close-coupled Centrifugal Pump

The Pulse of Petroleum and Petro Chem Production—PUMPS

AURORA PUMP DIVISION
Aurora, Ill.
Liquid Handling Pumps, AURORA Centrifugals and APCO deep well Turbines, 7000 gpm, 500 ft. heads. APCO Turbine-type, 150 gpm, 600 ft. heads. Condensate Return Units.

KINNEY MANUFACTURING DIVISION
Boston, Mass.
KINNEY Rotating Plunger and Heliquad Liquid Handling Pumps, to 3000 gpm. Vacuum Pumps, 0.2 micron, evacuate 1800 cfm.

KALAMAZOO DIVISION
Kalamazoo, Mich.
HYDRECO Gear-Type Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 3 to 52 hp; Cylinders; Control and Auxiliary Valves; 1500 psi. DUDCO Dual-Vane Hydraulic Pumps, 3 to 120 gpm; Fluid Motors, 7 to 140 hp; 2000 psi operation.

WATERTOWN DIVISION
Watertown, N.Y.
Railroad air brake equipment of all types, STRATOPOWER Hydraulic Pumps for Aircraft, to 3000 psi.

Always on the move... from well to tank farm and tank ship... from oil field to pumping station... from pipe line to refinery... oil and gas in their many consistencies, reach their final destination through Pumps. Surveys show that the petroleum industry requires a greater variety of Pump types and Pump sizes than any other. These surveys also show that Pumps made by Divisions of The New York Air Brake Company play important roles in keeping petroleum on the move *economically*.

For crude, diesel fuel, lubricating and other light oils there are AURORA Centrifugal Pumps by the thousands. APCO Turbine-type Pumps handle the gasolines, naphthas and other volatile, non-lubricating fluids. For tars, waxes, bunker fuel and asphalt KINNEY Rotating Plunger and Heliquad Gear Pumps move the seemingly "unpumpables" along the road to the consumer. But, the services rendered to Petroleum (as well as other industries) by The New York Air Brake Company go well beyond the sphere of Liquid Handling equipment.

The Kalamazoo Division, for example, produces the DUDCO and HYDRECO Fluid Power components, so well known throughout industry, for rotary tables, cat heads and the numerous functions of portable drill rigs. DUDCO Fluid Motors serve to open and close remote pipe line valves.

In the areas of distillation and petrochemical production, the KINNEY MFG. Division makes a significant contribution with KINNEY High Vacuum equipment. Last, but not least, The New York Air Brake Company furnishes the added factor of safety to tank cars that transport petroleum products—the Air Brake equipment for which the company is named.

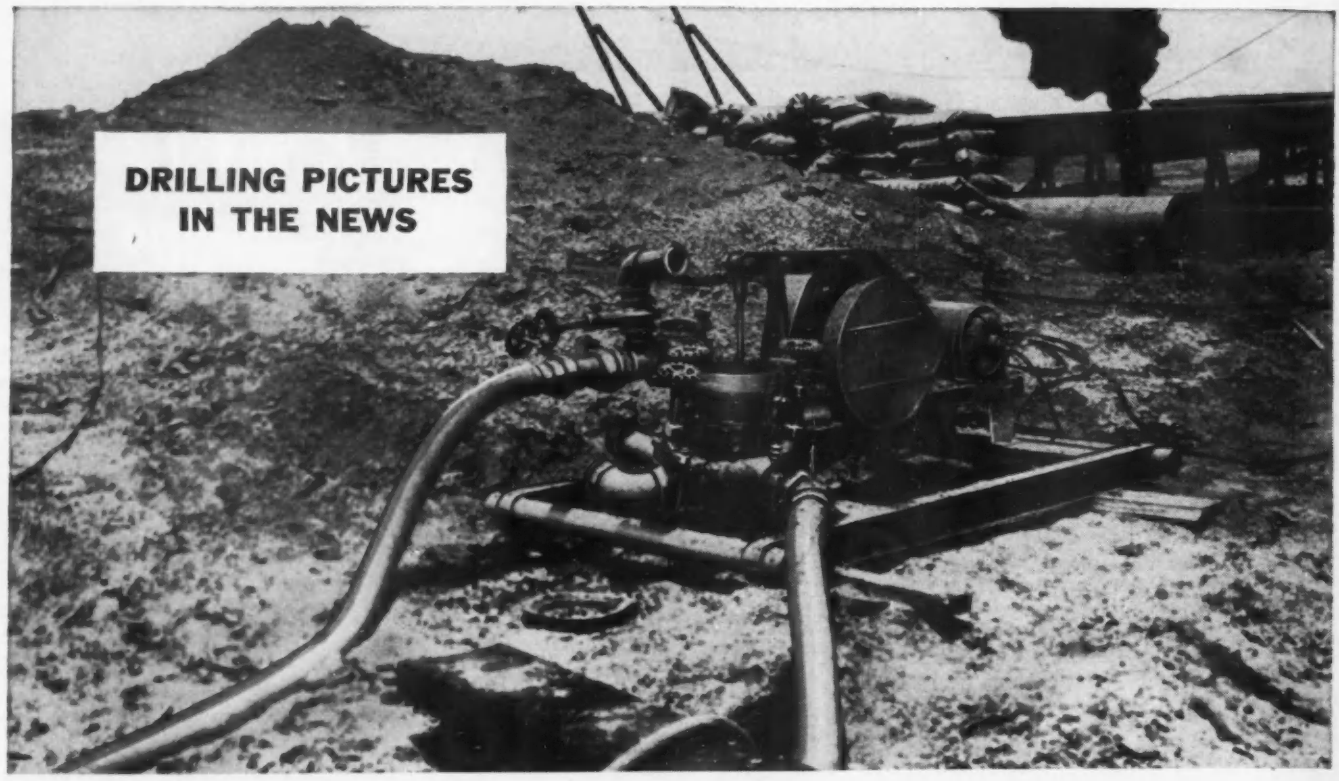
Read this company's fascinating story of diversification and progress. Write for Bulletin 1102.

THE NEW YORK AIR BRAKE COMPANY

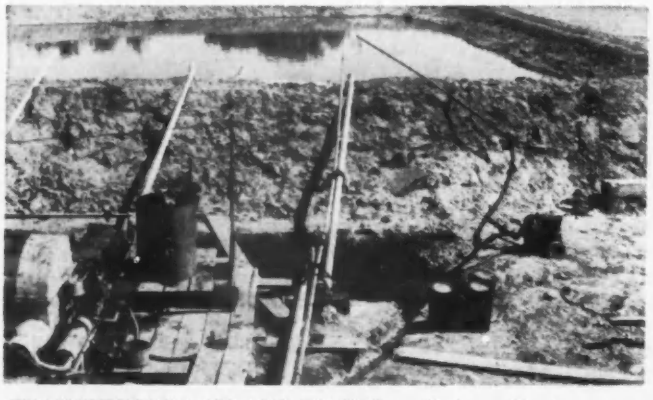
230 PARK AVENUE • NEW YORK 17, N. Y.

INTERNATIONAL SALES OFFICE, 90 WEST ST., NEW YORK 6, N.Y.

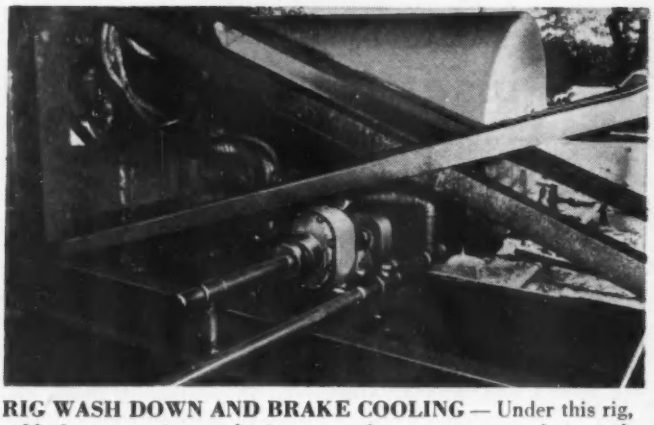
(For more data on advertised products, use Readers' Service blue cards, last page this issue.)



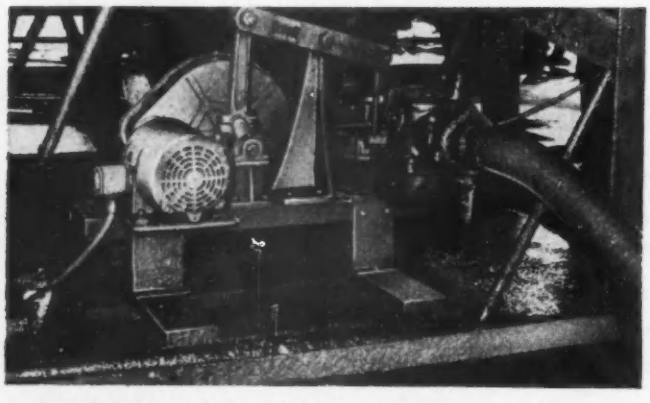
MIXING MUD — Because they handle everything from water to heavy slurry, Marlow Mud-Hog skid-mounted diaphragm pumps are widely used on the fields for mixing and transferring mud. This unit is electric motor-driven and can be run from the rig's generators. Models are available either gasoline-engine or electric-motor driven, and may be arranged for skid or wheel mounting.



TRANSFERRING OIL AND WATER — Marlow self-primers are widely used for transferring oil and water from slush pits to settling ponds. Very effective on intermittent operations.



RIG WASH DOWN AND BRAKE COOLING — Under this rig, a Marlow pump is transferring water from a storage tank to wash down hoses and the cooling jacket on the drilling rig.



TRANSFERRING OIL SLUDGE — This 4-inch Mud-Hog pump with gearhead motor is pumping heavy wastes to a slush pit. Heavy duty construction assures long, dependable operation.

Marlow PUMPS

5-293

MARLOW PUMPS

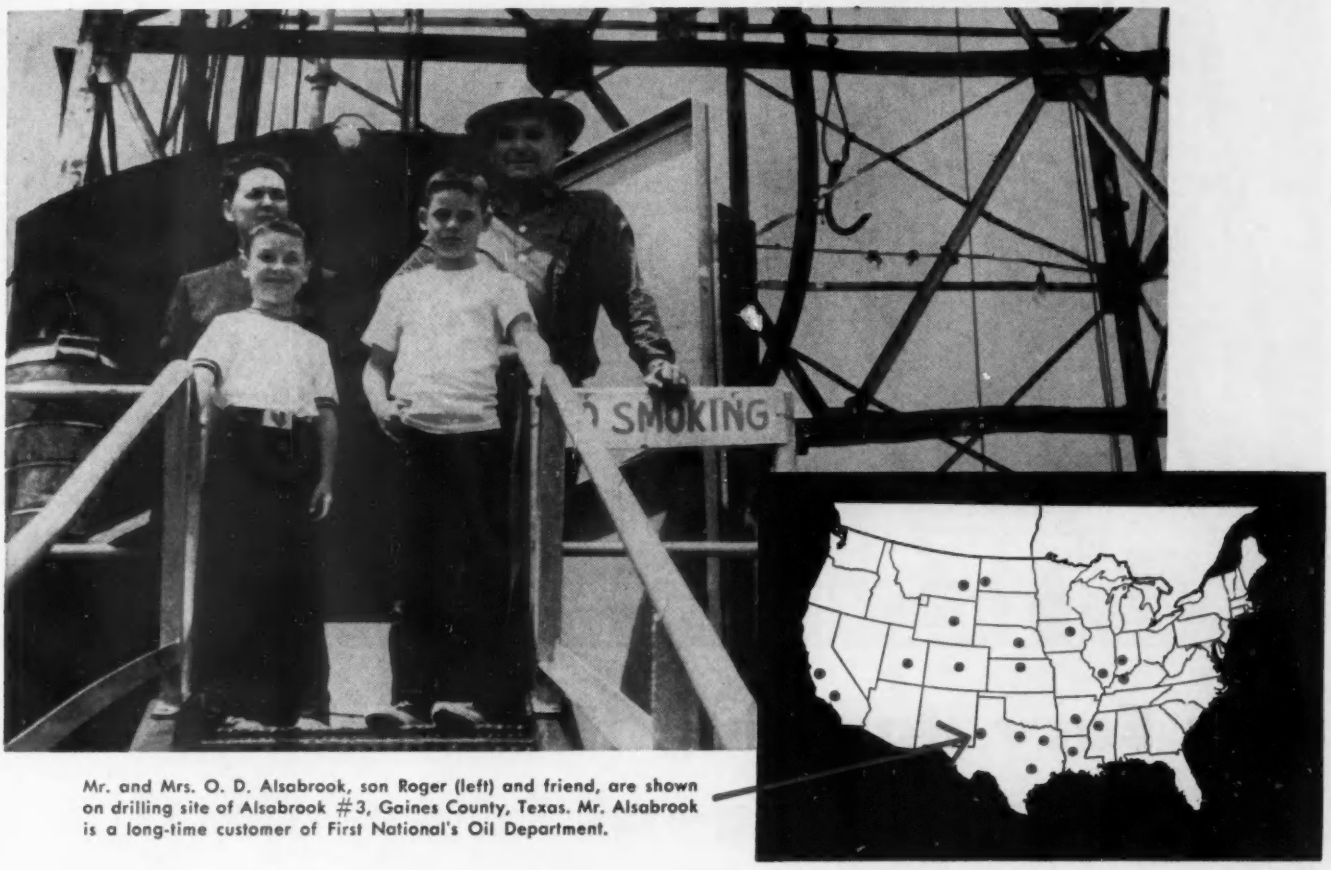
Division of Bell & Gossett Company

RIDGEWOOD, NEW JERSEY

Morton Grove, Illinois Longview, Texas

For literature and name of your Marlow dealer write:

Financing from the **FIRST** *in Dallas goes where you go!*



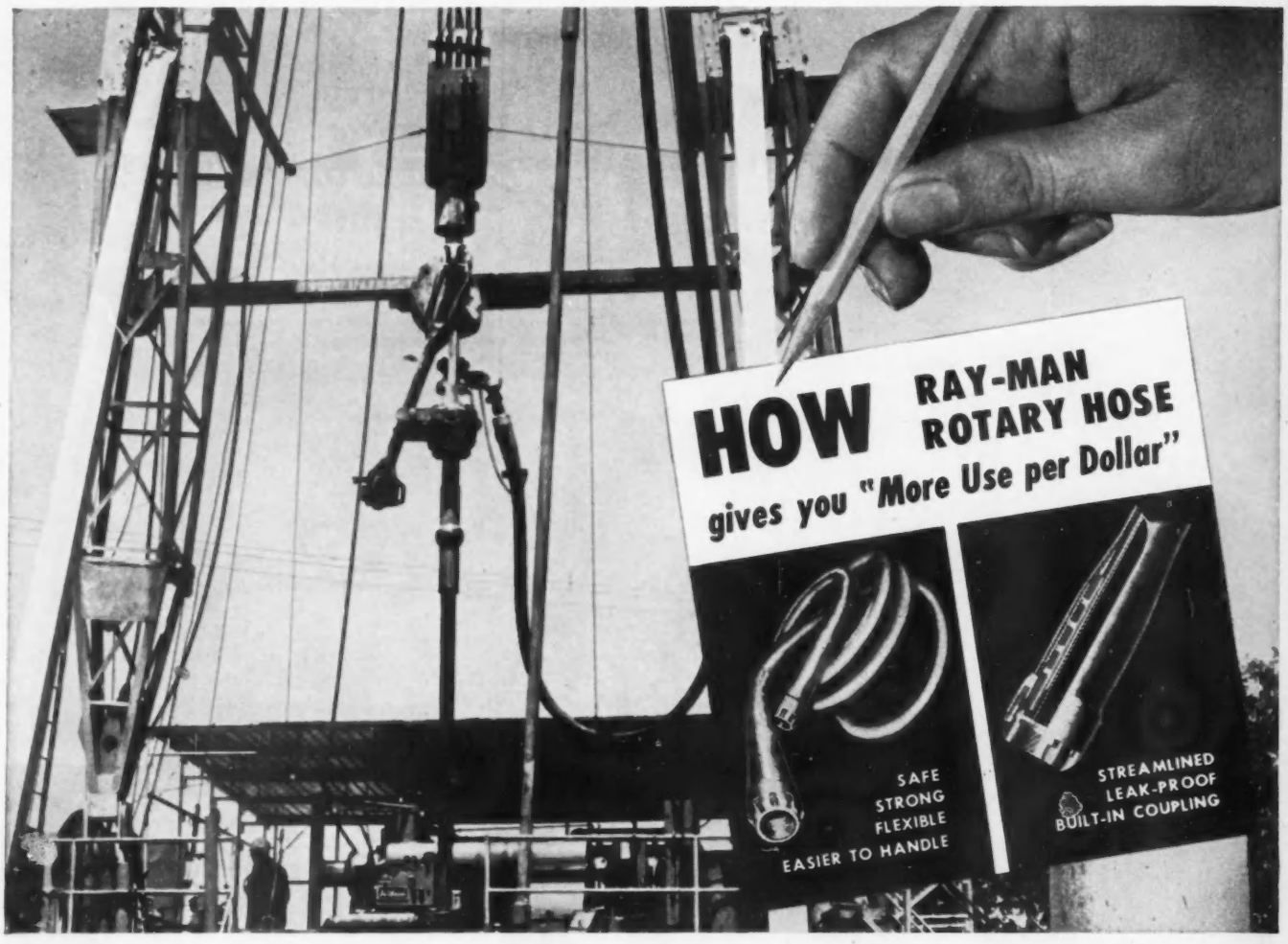
Mr. and Mrs. O. D. Alsabrook, son Roger (left) and friend, are shown on drilling site of Alsabrook #3, Gaines County, Texas. Mr. Alsabrook is a long-time customer of First National's Oil Department.

- Straight collateral loans on oil or gas producing properties, secondary recovery, refining plants, pipe lines and progressive loans.
- Oil and gas payment loans.

FIRST NATIONAL BANK in Dallas

Member Federal Deposit Insurance Corporation

put FIRST financing in your own oil future



This Easy Handling Hose Assures You Safer Drilling—at Lower Cost!

The Manhattan method of applying high-tensile steel cable wires under precisioned tension gives Ray-Man CBL Rotary Hose a degree of strength plus flexibility—and safety—never before equalled. Ray-Man CBL Rotary Hose also has unusual resistance to kinking or accidental crushing. This strength and flexibility are achieved without bulk. Therefore, it is easier to rig-up without accident . . . it holds steadier in the derrick without whipping—even under the high pressures of deep drilling. The result: Your drilling costs are cut because you get longer, trouble-free service.

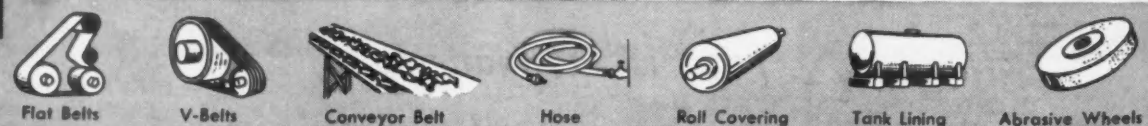
Long-life and safer, easier handling are also insured by Manhattan's streamlined, built-in hose coupling. It is equipped with a special leak-proof "Lip-Lok" seal that tightens under pressure to prevent costly blow-outs. This hose coupling has no protruding lugs or flanges—nothing to cause fouling or damage on the job.

Bulletin #6743 describes other features which add up to the highest safety factor, longest life and lowest cost per foot drilled . . . "More Use per Dollar" . . . with Ray-Man CBL Rotary Hose. RM-614

R/M

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.



Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls

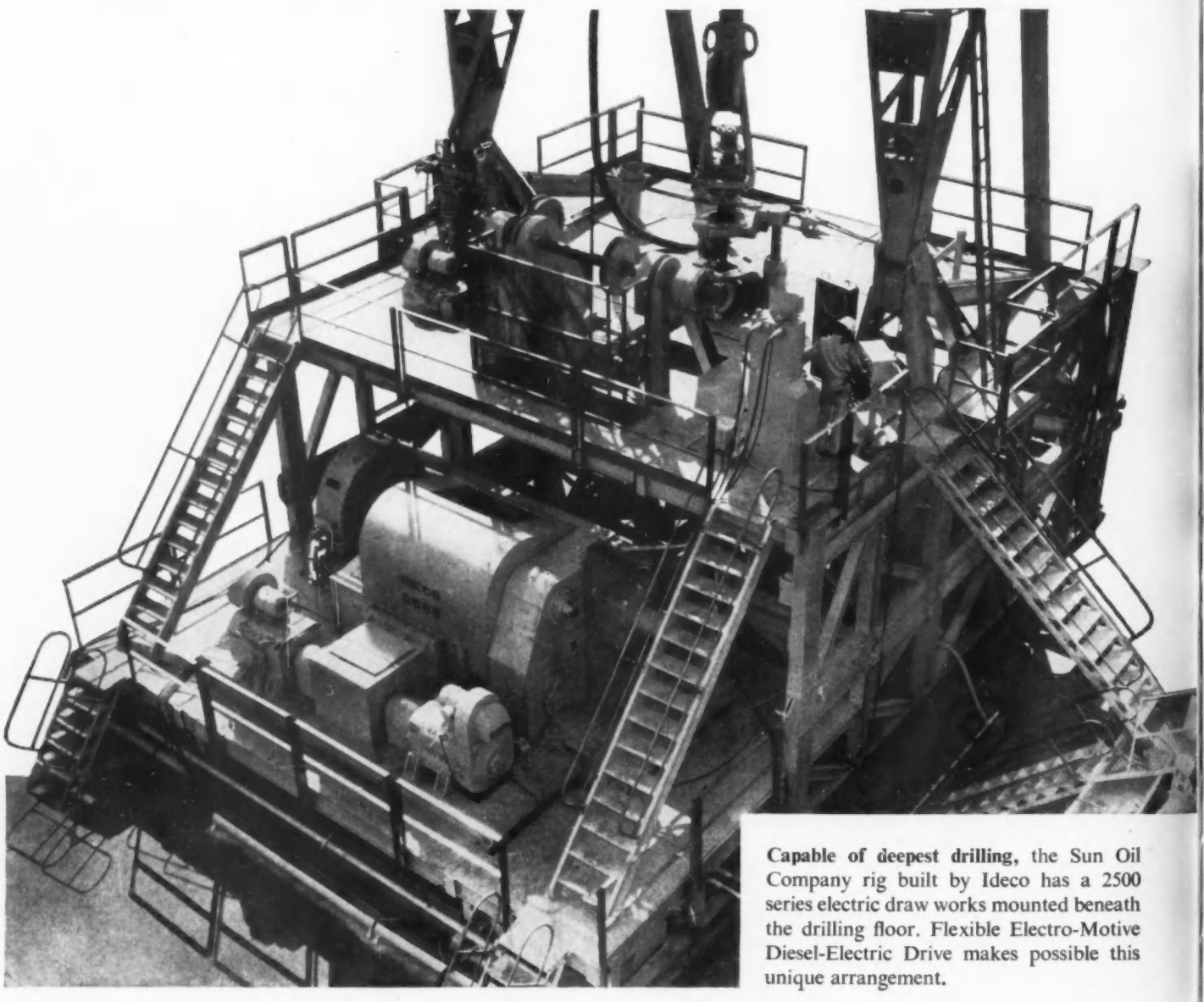
 (For more data on advertised products, use Readers' Service blue cards, last page this issue.)

Baroid products and Baroid services are preferred by major and independent oil firms.

...the sign of successful drilling BAROID

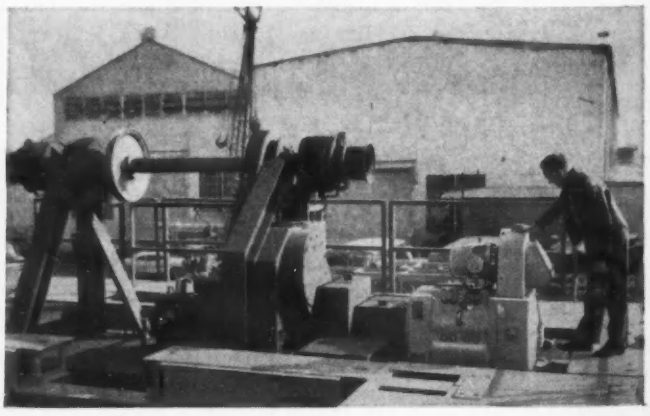
5801

It's the cleanest, most



Capable of deepest drilling, the Sun Oil Company rig built by Ideco has a 2500 series electric draw works mounted beneath the drilling floor. Flexible Electro-Motive Diesel-Electric Drive makes possible this unique arrangement.

B. H. Hefner, Chief Electrical Engineer of Electro-Motive Division (center), discusses application of GM Diesel-Electric Drive with "Buck" Wilder of Sun Oil Company (left) and W. O. Cook, Vice-President of Ideco.



Newell B. Collins, Electro-Motive Service Engineer, inspects arrangement of drilling platform, where only one motor is mounted to drive rotary table and cathead.

Dowell engineers at remote controls of three Allison powered pumpers during high-injection-rate fracturing treatment.

Aircraft power for faster injection

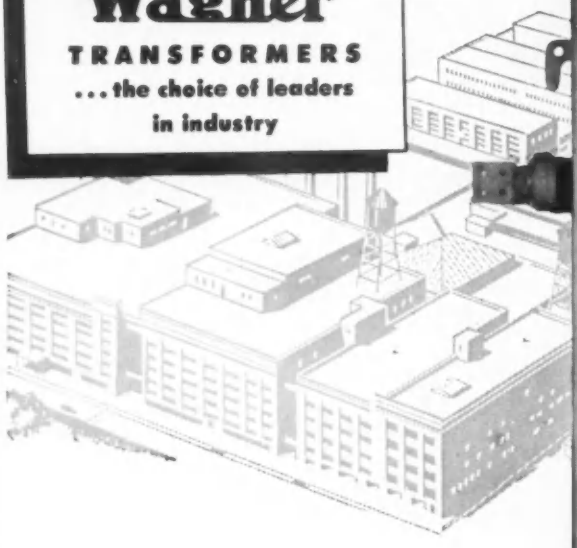
High-injection-rate fracturing provides better distribution of sand and treating fluid throughout the pay section. This means increased drainage area and a slower production decline. To give you the injection rates you need, with less equipment, Dowell now offers a new pumping unit powered by the famous 1500-h.p. Allison aircraft engine. Pound for pound, this unit delivers more horsepower than any other pumper in the oil fields.

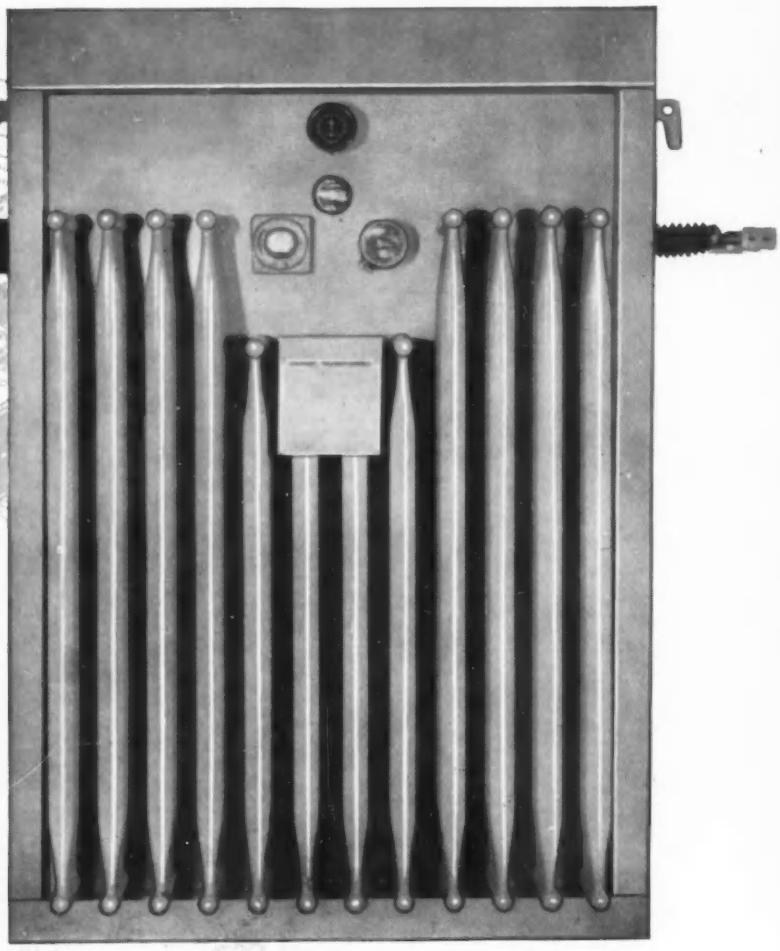
Ask Dowell about using its great new frac team: (1) the Allison engine pumper for the power you need; (2) the exclusive Remote Control Unit which provides unmatched safety for men and equipment; (3) the new Dowell blender for controlled mixing of up to 35 barrels of oil and sand per minute.

services for the oil industry **DOWELL**

A Service Subsidiary of The Dow Chemical Company
DOWELL INCORPORATED • TULSA 1, OKLAHOMA

Wagner®
TRANSFORMERS
...the choice of leaders in industry





PLANNING A NEW LOAD CENTER?

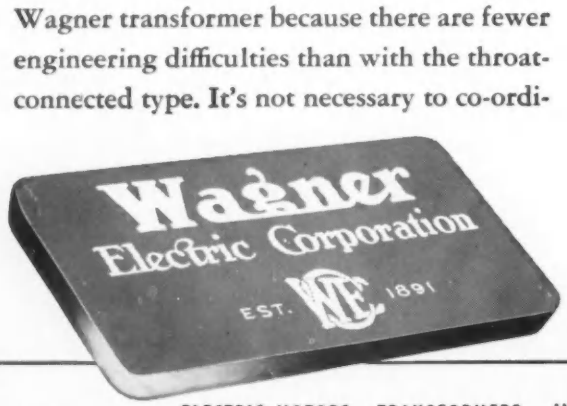
...with the Wagner Close-Coupled Transformer, you can build a compact, modern unit substation

These Unit Substation Transformers save space...make a neat, streamlined installation

Wagner close-coupled, liquid-filled unit substation transformers can be easily flush-mounted with co-ordinated switchgear. And when they are, the result is a neat, modern, compact installation that not only saves space in your plant, but looks better too.

You get quicker delivery on a close-coupled Wagner transformer because there are fewer engineering difficulties than with the throat-connected type. It's not necessary to co-ordinate the bushing height of a close-coupled unit to match special switchgear. Bushing heights are designed to give ample room to make connection to switchgear or busses in the switchgear compartment or transition section. No need for special throats to match special switchgear.

Look to Wagner for transformers that assure a continuous dependable flow of power. Your nearby Wagner engineer will be glad to help you solve your load-center problems. Call the nearest of our 32 branch offices or write us.

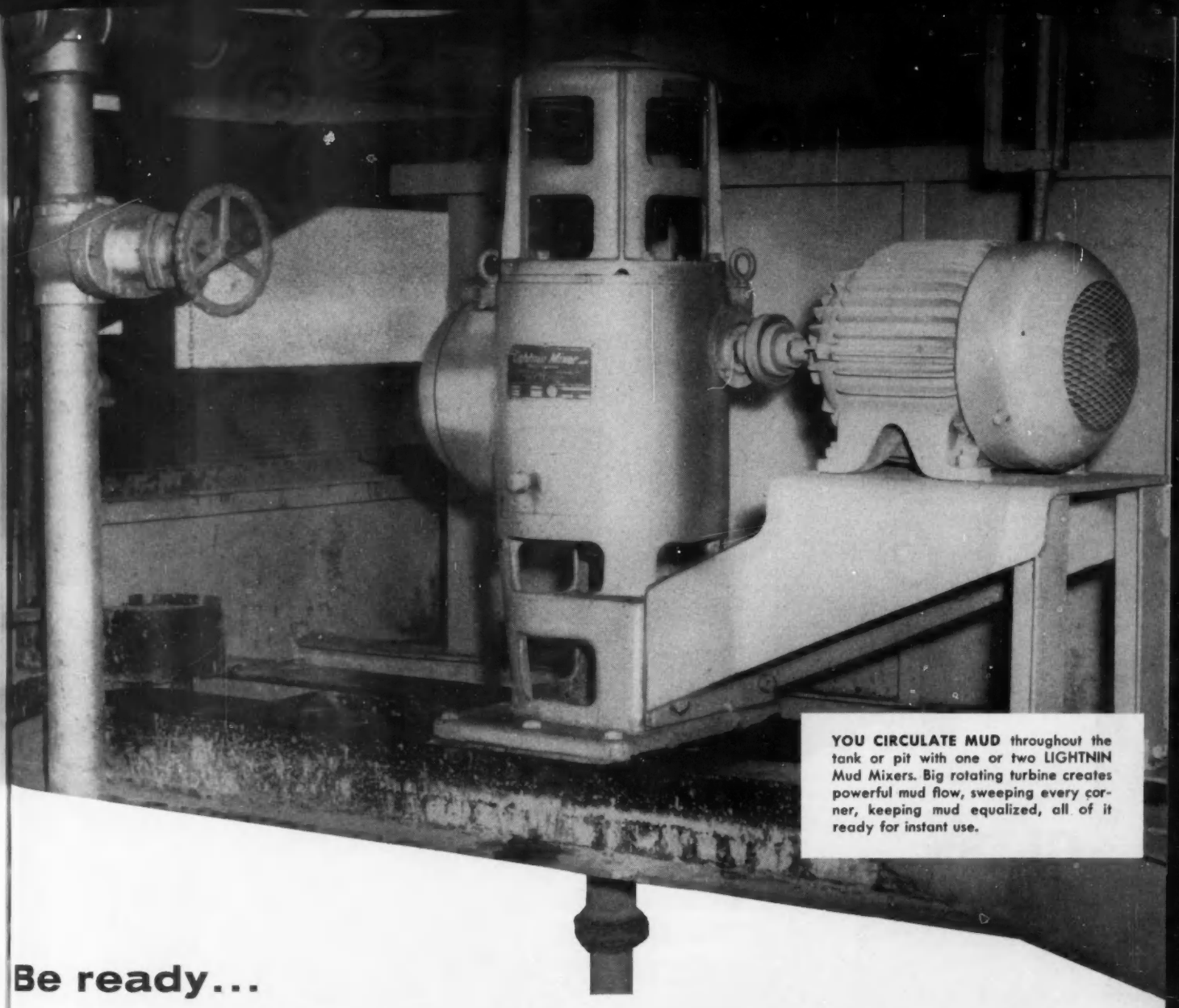


Wagner Electric Corporation
6457 Plymouth Ave., St. Louis 14, Mo., U. S. A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

T56-4

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC



YOU CIRCULATE MUD throughout the tank or pit with one or two LIGHTNIN Mud Mixers. Big rotating turbine creates powerful mud flow, sweeping every corner, keeping mud equalized, all of it ready for instant use.

Be ready...

with mud you can change in seconds!

Here's how: Use this amazingly fast new way to get mud in condition—and keep it there.

On drilling tenders off the Gulf Coast—on the world's deepest holes—all up and down the oil country, drilling men are getting an *immediate* rise in mud weight when they want it.

You can, too. When you mix your mud with LIGHTNIN Mixers, you can increase the weight of every gallon of mud in the tank or pit, by the exact amount you want—*in a few seconds.*

You get *immediate dispersion* of gel additions—and fully uniform viscosity in minutes.

When you need heavier, thicker mud, *it's there*—ready for instant use.

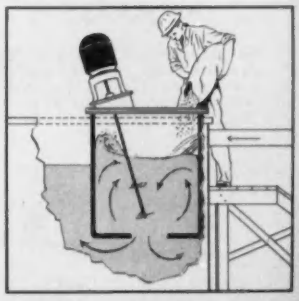
Cut maintenance, too

You gain in many other ways, too, with LIGHTNIN Mixers in your mud tanks or mud pits. You use *less* mud; put *less* demand on your pumps; spend *less* on equipment maintenance. On deep holes, you can eliminate the entire cost of a third mud pump.

You take no risk when you choose LIGHTNIN Mixers. Every LIGHTNIN is unconditionally guaranteed to do the mixing job right.

See for yourself why LIGHTNINs can give you better mud control—for less money. Ask your LIGHTNIN sales engineer (listed in Composite Catalog) to arrange a visit to a rig in your area so you can see LIGHTNINs at work.

And for quick facts on LIGHTNIN mud control, send us a postal today requesting free illustrated Bulletin B-502.



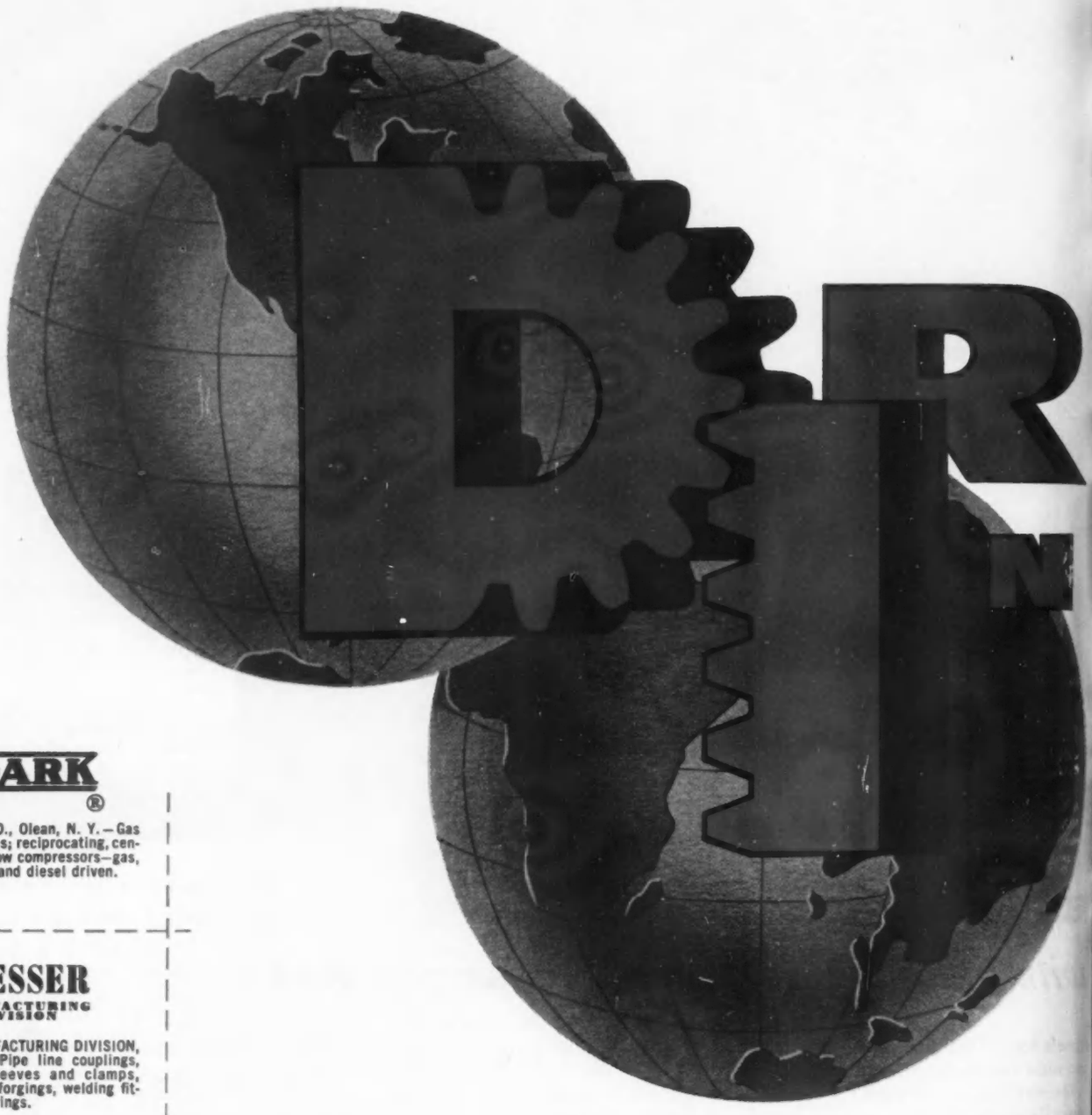
YOU FLASH-MIX weight and gel additions into the mud through a LIGHTNIN Flash Mixer. High-speed propellers break lumps and give instant dispersion of weight and gel in the incoming mud. Feed additions fast as you want—no clogging, no waiting.

MIXING EQUIPMENT Co., Inc., 197-b Mt. Read Blvd., Rochester 11, N.Y.

In Canada: Greey Mixing Equipment Ltd., Toronto 10, Ont.

Lightnin® Mixers™

GEARED



CLARK®

CLARK BROS. CO., Olean, N. Y.—Gas turbines; engines; reciprocating, centrifugal, axial flow compressors—gas, steam, electric and diesel driven.

DRESSER
MANUFACTURING DIVISION

DRESSER MANUFACTURING DIVISION, Bradford, Pa.—Pipe line couplings, pipe repair sleeves and clamps, weldments and forgings, welding fittings, flanges, rings.

DRESSER **IDECO**

DRESSER-IDECO COMPANY, Columbus, Ohio—Radio and television broadcasting towers, steel buildings, aircraft hangars, mechanical parking garages, electric power substations.

IDECO®

IDECO, Dallas, Tex.—Hydrair* and Power Rigs; Full-View* Masts; substructures; single, dual and Drive-In Rambler Rigs; blocks, swivels, rotaries; mud-pumps; petroleum equipment and supplies.
*Trademark registered

LANE WELLS COMPANY

LANE-WELLS CO., Los Angeles, California, Houston, Tex., Oklahoma City, Okla.—Electric and Radioactivity Well Logging, Koneshot* perforating and bullet perforating, packers and bridging plugs.
*Trademark registered

Magcobar®

MAGNET COVE BARIUM CORP., Houston, Texas—Magcobar* and Magcogel* drilling muds and other specialized oil well drilling fluids and chemicals.
*Trademark registered

PACIFIC®

PACIFIC PUMPS, INC., Huntington Park, Calif.—Centrifugal pumps for refineries, power stations, pipelines, and chemical plants; plunger pumps for oilwells.

ROOTS R C SINCE 1854 CONNERSVILLE®

ROOTS-CONNERSVILLE BLOWER DIVISION, Connersville, Ind.—Rotary positive and centrifugal blowers, gas pumps and exhausters; positive displacement meters and vacuum pumps; inert gas generators.

Security

SECURITY ENGINEERING DIVISION, Dallas, Tex., Whittier, Calif.—Rock bits, reamer rock bits and hole openers; reamers, casing scrapers and Neo-Red rubber stabilizers.

SIE

SOUTHWESTERN INDUSTRIAL ELECTRONICS, Houston, Texas—Seismograph systems and instruments—electronic, electro-mechanical. Computers—analog and digital; recording systems. Special transformers and reactors.

Richardson-Bass, John Mecom, Freeport Sulphur, 1 L Humble — L-L-&E — State Lease 2414, Plaquemines Parish, La., 22,570 ft.

Engine valves for free pump are made from a hardenable chromium-nickel stainless steel, which not only resists attack by oil well corrosives, but also resists wear by metal and abrasives including sand. As a result, these valves assure the long, trouble-free performance desired by oil well operators. The pump is a product of Kobe, Inc., Huntington Park, California.

Stainless Steel adds years to "Free Pump" life ...by helping to resist corrosion, erosion and abrasion

Stainless steel valve resists failure from corrosion, erosion and wear! *Despite two to five years' pumping from the bottom of wells.*

That's the sort of performance oil well operators report for type 414 nickel-containing stainless steel valves in the Kobe "Free Pump."

Type 414 (12% Cr – 2% Ni) has superior hardening capacity as compared to otherwise similar non-nickel containing martensitic grades, and also slightly better corrosion resistance. Because of its better hardening capacity, in the hardened condition it possesses superior resistance to erosion by sand and other abrasives. Valve cages made of type 414 stainless steel have shown four times the life of materials previously used for combating the severe "washing" opposite the valve balls.

Other triplex pump parts produced in nickel-containing stainless steels . . . for high strength and resistance to corrosion . . . include sleeve seals and valve ball followers.

Where you want lasting performance put an alloy containing nickel to work. We'll be glad to help you select exactly the right one. Write for List A of available publications. It includes a simple form that makes it easy for you to outline your problem.

INCO TRADE MARK **THE INTERNATIONAL NICKEL COMPANY, INC.** 67 Wall Street New York 5, N. Y.